ADDENDUM NO. 01

January 25, 2022

Carmel High School Natatorium
520 Est Main Street
Carmel, IN, 46032

TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications, and the Drawings dated January 10, 2022, by Fanning/Howey Associates, Inc. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Pages ADD 1-1_through ADD 1- 4, Specification Sections 00 31 00 – Indiana Bid Form, 00 50 00c – A132 Exhibit A-2019 – Insurance and Bonds, 00 70 00c – A232-2019 – General Conditions, 01 12 00b- Multiple Contract Summary, 01 23 00 Alternates, 01 32 00 – Schedules, and attached Fanning/Howey Associates, Inc. Addendum No. 1, dated January 25, 2022, consisting of 7 pages Specification Sections 31 41 00 - Pre-Cast Structural Concrete, 04 20 00 – Unit Masonry, 05 52 13 – Pipe and Tube Railings, 07 54 00 – Thermoplastic Membrane Roofing, 07 81 00 – Applied Fireproofing, 08 56 00 – Special Function Windows, 08 71 00 – Door Hardware, 08 87 23 – Safety and Security Film, 09 51 13 – Acoustical Panel Ceilings, 09 54 23 – Linear Metal Ceilings, 09 65 19 – Resilient Tile Flooring, 09 96 00 – High Performance Coatings, 10 28 00 – Toilet Bath and Laundry Accessories, 11 31 00 – Appliances, 12 32 16 – Manufactured Plastic-Laminate Faced (Educational) Casework, 12 63 13 – Stadium and Arena Seating, 12 93 00 – Site Furnishing and Amenities, 13 15 00 – Carmel Specs 1622 Final, 13 15 60 – Carmel High School Scoreboard 1622 Final, 23 31 16 – Nonmetal Ducts, 23 73 13 – Modular Indoor Central Station Air Handling Units, 23 73 15 - Pool Dehumidification Units, 23 74 13 - Packaged Outdoor Central Station Air Handling Units, 23 82 33 – Convectors, 27 11 13 – Communications Entrance Protection, 27 41 00 – Professional Audio Sound Reinforcement Systems, 32 17 13 – Parking Bumpers, and 32 31 13 – Chain Link Fences and Gates, New Drawing Sheet: S3.16, and Revised Drawing Sheets: G1.1, G1.2, G1.3, G1.4, G1.5, G2.2, G4.1, G4.2, S1.02, S1.03, S1.04, S3.06,S3.10, S3.13, AD.06, A1.01, A1.10, A1.11, A1.12, A1.16, A7.09, A7.10, A7.13, A7.14, A8.01, A8.02, A8.04, A8.05, A8.07, A8.15, A8.16, A8.17, A8.22, A8S.01, A10.04, PL0.0, PL9.0, PL11.0, PLE2.0, PLE3.0, MD.02, MD.03, MD.04, MD.05, MD.06, M2.02, M2.06, M2.07, M2.09, M2.10, M2.11, M2.12, M2.14, M3.02, M3.09, M3.10, M4.01, M4.02, M4.03, M5.01, M5.04, M5.05, ED.02, E4.03, E4.06, E4.07, E4.08, E5.01, E5.02, E5.07, E5.10, E8.01, T000, T1.03, T1.04, T1.05, and T5.01.

A. SPECIFICATION SECTION 00 31 00 – Indiana Bid Form

1. Page three (3) has been revised to show added alternates.

B. SPECIFICATION SECTION 00 50 00c–A132 EXHIBIT A-2019–INSURANCE & BONDS

1. Replace entire specification section 00 50 00c – A132 Exhibit A-2019 - Insurance and Bonds.

C. SPECIFICATION SECTION 00 70 00c – A232-2019 General Conditions

1. Replace entire specification section 00 70 00c – A232-2019 General Conditions.

D. SPECIFICATION SECTION 01 12 00 MULTIPLE CONTRACT SUMMARY

1. Paragraph 3.02 GENERAL REQUIREMENTS

Add the following information

General working hours are from 7am – 7pm per Carmel City Ordinance.

2. Paragraph 3.03A BID CATEGORY NO. 1 GENERAL TRADES

Add the following Specification Sections

Section 10 21 13.19 – Solid Polymer Compartments

Add the following Clarifications

44. Provide temp structure as depicted on site logistics plan for emergency egress at door 21 to be constructed with ¾ plywood sides and 2 layers of ¾ plywood on the top sandwiching 3" foamboard.

45. Provide ¾" Plywood protection over existing storefront windows on North face of existing natatorium.

46. Provide necessary temporary asphalt to maintain temporary bus drive shown at new round about as required.

47. Provide 4 knox locks for use on gates referenced in site logistics plan.

48. All mass excavation to bottom of footings including pool by general trades contractor.

Delete the following Clarifications

34. Temporary dust partitions as outlined in the interior partition plan in 02 20 00-Information Available to Bidders are to be constructed from framing lumber and reinforced visqueen. All partitions should include a ZipWall for pedestrian access. All components are to be maintained on a regular basis.

37. General Trades contractor to provide, install, and maintain crane access road as outlined in the Crane Access Plan.

3. Paragraph 3.03B BID CATEGORY NO. 2 MASONRY

Add the following Specification Section

Section 01 52 60 – Rubbish Container

Section 04 20 00 – Unit Masonry

Delete the following Clarifications

2. Contractor shall include any sleeves indicated per plans passing through their work

4. Paragraph 3.03D BID CATEGORY NO. 4 ROOFING

Add the following Specification Section

Section 06 16 00 – Sheathing

5. Paragraph 3.03E BID CATEGORY NO. 5 METAL, STUDS, DRYWALL, ACOUSTICAL

Add the following Specification Sections

Section 06 10 00 – Rough Carpentry

Section 09 84 33 – Sound Absorbing Wall Units

Delete the following Specification Section

Section 07 81 00 – Applied Fireproofing

Add the following Clarification

10. Contractor to be responsible for interior expansion joint cover assemblies in new drywall partitions only.

6. Paragraph 3.03G – BID CATEGORY NO. 7 PAINTING

Add the following Specification Section

Section 09 72 16 – Vinyl Coated Fabric Wall Coverings

7. Paragraph 3.03L BID CATEGORY NO. 12 FIRE PROTECTION

Add the following Clarification

6. Contractor responsible for caulking their own penetrations including but not limited fire and sound caulking.

8. Paragraph 3.03M BID CATEGORY NO. 13 PLUMBING

Add the following Clarification

6. Contractor responsible for caulking their own penetrations including but not limited fire and sound caulking.

9. Paragraph 3.03N BID CATEGORY NO. 14 HVAC

Add the following Clarification

9. Contractor responsible for caulking their own penetrations including but not limited fire and sound caulking.

10. Paragraph 3.03N – BID CATEGORY NO. 15 – ELECTRICAL & TECHNOLOGY

Add the following Clarification

14. Provide temporary lighting in door 21 temporary egress structure.

15. Contractor responsible for caulking their own penetrations including but not limited fire and sound caulking.

Delete the following Clarification

10. Door 21 Camera

E. SPECIFICATION SECTION 01 32 00 SCHEDULES

1. Guideline schedule

F. SPECIFICATION SECTION 01 53 10 FENCES

1. Part 3 – Execution

3.01 INSTALLATION PARAGRAPH D

Replace paragraph D with the following:

D. Provide gate posts and gates for (4) 20’-0” side openings (each opening to contain (2) 10’0” leaves with a forked type or plunger type latch to permit operation from either side of gate with a padlock eye as an integral part of the latch. Reference site logistics plan for locations.

CONTRACTOR'S BID FOR PUBLIC WORKS FORM NO. 96

Format (Revised 2013)
(Amended for CCS)

Carmel High School Natatorium

Carmel Clay Schools

Hamilton County, Indiana

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year):_____

BIDDER (Firm) _____

Address _____ P.O. Box _____

City/State/Zip ___

Telephone Number: _____ Email Address: _____

Person to contact regarding this Bid_____

Pursuant to notices given, the undersigned offers to furnish labor and/or materials necessary to complete the public works project of:

_____

Insert Category No. (s) and Name(s)

Of public works project, ***Carmel High School Natatorium***, in accordance with Plans and Specifications prepared by ***Fanning Howey Associates, Inc., 350 E. New York Street, Indianapolis, IN 46204***, as follows:

BASE BID

For the sum of _____

(Sum in words)

_____DOLLARS ($_____)

(Sum in figures)

The undersigned acknowledges receipt of the following Addenda:
Receipt of Addenda No. (s) _____

PROPOSAL TIME

Bidder agrees that this Bid shall remain in force for a period of sixty (60) consecutive calendar days from the due date, and Bids may be accepted or rejected during this period. Bids not accepted within said sixty (60) consecutive calendar days shall be deemed rejected.

Attended pre-bid conference YES _____ NO_____

Has visited the jobsite YES _____ NO_____

The Bidder has reviewed the Guideline Schedule in Section 01 32 00 and the intent
Of the schedule can be met. YES _____ NO_____

Bidder has included their Written Drug Testing Plan that covers all employees of the bidder who will perform work on the public work project and meets or exceeds the requirements set in IC 4-13-18-5 or IC 4-13-18-6. YES _____ NO_____

The Skillman Corporation's diversity initiative is to create a program to encourage, assist and measure the active participation of Minority- Owned, Women-Owned, Veteran – Owned and Disabled Individual-Owned Businesses. The Program is to ensure that MWVDBEs are provided full and equal opportunity to participate in all Skillman Corporation's Projects.

Bidder has included:
DBE: YES _____% NO _____
MBE: YES _____% NO _____
WBE: YES _____% NO _____
VBE: YES _____% NO _____

The undersigned further agrees to furnish a bond or certified check with this Bid for an amount specified in the Notice to Bidders. If Alternate Bids apply, submit a proposal for each in accordance with the Plans and Specifications.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit bases, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS
(if applicable)

I, the undersigned bidder, or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ALTERNATE BIDS

Alternate No. 1: Provide alternative Regenerative DE Filter System for all pools in lieu of specified system. System must be by a single manufacturer.

Alternate No. 2: Provide alternative Chemical Feeders, Tablet Chlorine and Tablet PH Feed System, in lieu of specified system. System must be by a single manufacturer

Alternate No. 3: Provide alternative Fiberglass Bulkhead Assembly in lieu of specified system. Bulkhead must be by a single manufacturer.

Alternate No. 4: Provide alternative Ultraviolet System in lieu of specified system. System must be by a single manufacturer.

Alternate No. 5: Provide alternative Chemical Controller System in lieu of specified system. System must be by a single manufacturer.

PART II

(For projects of $150,000 or more – IC 36-1-12-4)

These statements to be submitted under oath by each bidder with and as a part of his bid. (Attach additional pages for each section as needed.)

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you?_____If so, where and why?

_____

_____

_____

4. List references from private firms for which you have performed work.

_____

_____

_____

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed Work. (Examples could include a narrative of when you could begin, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)

_____

_____

_____

_____

2. Please list the names and addresses of all subcontractors (i.e. persons or firms outside your own firm who have performed part of the work) that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

_____

_____

_____

_____

3. If you intend to sublet any portion of the work, state the name and addresses of each subcontractor, equipment to be used by the subcontractor, and whether you will required a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

_____

_____

_____

_____

4. What equipment do you have available to use for the proposed Project? Any equipment used by subcontractors may also be required to be listed by the governmental unit.

_____

_____

_____

_____

5. Have you into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which corroborate the process listed.

_____

_____

_____

_____

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of Bidder's financial statement is mandatory. Any Bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the Contract must be specific enough in detail so that said governing body can make a proper determination of the Bidder's capability for completing the Project if awarded.

SECTION IV CONTRACTOR NON-COLLUSION AFFIDAVIT

The undersigned Bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that this Bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporations has, have, or will receive directly or indirectly, any rebate, fee, gift, commission, or thing of value on account of such contract.

SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT

Dated at _____this _____ day of _____, 20

_____
(Name of Organization)

By

_____

_____
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
) SS:
COUNTY OF _____)

Before me, a Notary Public, personally appeared the above-named

_____

Swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this _____ day of _____,

_____
(Title)

_____
Notary Public

My Commission Expires: _____

County of Residence: _____

END OF SECTION 00 31 00

AIA® Document A132™ – 2019 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the day of in the year
(In words, indicate day, month, and year.)

for the following **PROJECT**:
(Name and location or address)

THE OWNER:
(Name, legal status, and address)

THE CONTRACTOR:
(Name, legal status, and address)

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER'S INSURANCE

A.3 CONTRACTOR'S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A232™–2019, General Conditions of the Contract for Construction. Article 11 of A232™–2019 contains additional insurance provisions

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A232™–2019, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

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§ A.2.3 Required Property Insurance

§ A.2.3.1 The Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, the Construction Manager, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

Unless otherwise provided in the Contract Documents, the property insurance obtained by the Owner as required by Section A.2.3 shall not cover portions of the Work stored off the site, portions of the work in transit, or work under the possession and control of the Contractor, but not yet incorporated into the permanent part of the Project.

Property insurance provided by the Owner as required by Section A.2.3 shall not cover any tools, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as constructive equipment that may be on the Project site and the capital value of which is not included in the Work. The Contractor and Subcontractors shall make their own arrangements for any insurance it may require on such construction equipment. The Contractor waives all claims and all rights of subrogation against the Owner, the Construction Manager, and the Architect for loss or damage to tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, equipment, materials and supplies.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's, Construction Manager's, and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Contractor shall be responsible for all loss not covered because of such deductibles or retentions up to $10,000 per claim.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of

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coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures
If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.
The Owner may purchase and maintain the other insurance as needed or recommended by their insurance professional.

(Paragraphs deleted)
ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS
§ A.3.1 General
§ A.3.1.1 Certificates of Insurance. Prior to starting work on the Project, the Contractor shall provide certificates of insurance in the form attached hereto and acceptable to the Owner and Construction Manager and to other parties upon request evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner, the Architect, and the Construction Manager as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. Completed operations coverage shall be for a period of two (2) years after final payment by the Owner. The additional insured coverage shall be primary and non-contributory (including completed operations) to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations for all claims and losses against Owner, the Architect, and the Construction Manager, including but not limited to those claims that arise out of injuries to employees of the Contractor, employees of Subcontractors, or injuries to third parties, from the Work performed by Contractor. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 (11/85) or CG 20 10 (10/01) and the CG 20 37 (10/01) or equivalent forms that contain "arising out of" causation language and prove "Your Work" coverage. With respect to the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, CG 20 32 07 04.

§ A.3.1.4 Contractor will require all Subcontractors and suppliers, and all Subcontractors will require all sub-Subcontractors and suppliers, to provide the same insurance coverages, additional insured requirements, and waivers of subrogation as required in the Contract Documents.

§ A.3.1.5 The failure to provide the insurance coverages as required in the Contract Documents will not relieve the Contractor or its Subcontractors or suppliers from their obligations to indemnify the Owner, Architect and Construction Manager under Section 3.18 of the modified General Conditions.

§ A.3.1.6 To the fullest extent permitted by law, Contractor for itself and on behalf of its workers' compensation, general liability, and automobile liability insurer(s) who may be obligated to pay claims, hereby waives and releases any and all rights and/or claims for subrogation, worker's compensation statutory lien or other rights and/or claims of

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recovery for said claims against Owner, Architect, and/or Construction Manager, who are liable or alleged to be liable for such claim arising from Contractor's performance of the Work. Contractor will obtain a waiver of any such claim or worker's compensation lien that its insurers may acquire against Owner, Architect and/or Construction Manager.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

Completed operations coverage shall be provided for two (2) years from the date of Final Payment to the Contractor.

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits as identified in the form attached hereto for products-completed operations hazard, providing coverage for claims including

- **.1** damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- **.2** personal injury and advertising injury;
- **.3** damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- **.4** bodily injury or property damage arising out of completed operations; and
- **.5** the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- **.1** Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- **.2** Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- **.3** Claims for bodily injury other than to employees of the insured.
- **.4** Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- **.5** Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- **.6** Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- **.7** Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- **.8** Claims related to roofing, if the Work involves roofing.
- **.9** Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- **.10** Claims related to earth subsidence or movement, where the Work involves such hazards.
- **.11** Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than the amounts identified in the form attached hereto per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower

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coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits or the amounts identified in the form attached hereto.

(Paragraphs deleted)

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:
(Specify type and penal sum of bonds.)

Type	Penal Sum ($0.00)
Payment Bond	One Hundred Percent (100%) Contract Sum
Performance Bond	One Hundred Percent (100%) Contract Sum

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

The costs of all bonds are included in the Contract Sum. The bonds shall meet all statutory requirements of the state in which the Project is located. The bonds shall be executed by a responsible surety licensed in the state in which the Project is located and approved by the Owner and shall remain in effect for a period not less than one (1) year following the date of Substantial Completion or the Contractor's warranty period, which ever time period is longer. The Contractor shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his or her power of attorney indicating the monetary limit of such power. Every bond must display the surety's bond number. A rider including the following provisions shall be attached to each bond. The Contractor shall keep the surety informed of the progress of, and changes in, the Work, and requests for reduction or release of retainage and for final payment. The surety shall agree that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract Documents. Any addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the surety of its obligations, and notice to the surety of such matters is hereby waived. The surety shall agree that it is obligated under the bonds to any successor, grantee, or assignee of the Owner.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

N/A

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AIA® Document A232™ – 2019

General Conditions of the Contract for Construction, *Construction Manager as Adviser Edition*

for the following PROJECT:
(Name, and location or address)

Carmel High School Natatorium
520 East Main Street
Carmel, IN 46032

THE CONSTRUCTION MANAGER:
(Name, legal status, and address)

The Skillman Corporation
3834 South Emerson Avenue, Building A
Indianapolis, IN 46203

THE OWNER:
(Name, legal status, and address)

Carmel Clay Schools
5201 East Main Street
Carmel, IN 46033

THE ARCHITECT:
(Name, legal status, and address)

Fanning Howey Associates, Inc.
350 East New York Street
Indianapolis, IN 46204

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, these General Conditions of the Contract (, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, transportation and services incidental thereto provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, calculations, studies, surveys, models, sketches, drawings, specifications, and other similar materials and electronic/digital information produced in relation to the Project.

(Paragraph deleted)

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§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. The Contractor shall promptly call to the attention of the Owner, the Construction Manager and the Architect any discrepancies or inconsistencies in the Drawings or Specifications that affect its Work. In the event of discrepancies or inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work, or (2) comply with the more stringent requirement. Figure dimensions shall take precedence over scale measurements, large scale details shall take precedence over small scall drawings, and drawings of a later date shall take precedence over those of an earlier date. Any part of the Work shown on the Drawings but not in the Specifications, or vice versa, shall be considered as part of the Work, the same as though included in both. The Work to be undertaken by the Contractor shall include all incidental work necessary for the completion of the Project even though it may not be specifically described in the Specifications or Drawings.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. When a duplication of labor, material or equipment occurs in the Drawings or the Specifications by assignment of work to separate Contractors, each Contractor shall be deemed to have bid on the basis of providing such labor, material and equipment and the Construction Manager shall decide which Contractor(s) shall provide the same, with appropriate adjustment to the Contract Sum.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

.1 Whenever a product is specified in accordance with a Federal Specification, an ASTM Standard, an American National Standards Institute Specification, or other association standard, the Contractor shall present an affidavit from the manufacturer when requested by the Owner or required by the Contract Documents, certifying that the product complies with the particular standard or specification. When requested by the Owner or the Construction Manager or required by the Contract Documents, support test data shall be submitted to substantiate compliance.

2. Whenever a product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names, or similar reference, no substitutions may be made unless accepted prior to execution of the Contract or if accepted as a change in the Work in accordance with the Contract Documents.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.4.1 The terms "knowledge," "recognize," and "discover," and their respective derivatives, when used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising reasonable care and skill.

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§ 1.4.2 The phrase "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor familiar with the Project and exercising the care, skill and diligence required of a contractor by the Contract Documents.

§ 1.4.3 The words "approved," "equal to" and "as directed", shall mean "to the satisfaction of the Construction Manager and/or Architect".

§ 1.4.4 The words "products" and "materials" shall include all materials, goods, supplies, systems, and equipment.

§ 1.4.5 The word "provide," including derivatives, shall mean to fabricate, transport, deliver, install, erect, construct, test, and furnish all labor, materials, equipment, apparatus, appurtenances, and all other items necessary to properly complete in place, ready for operation and use.

§ 1.4.6 The words "repeatedly fails" and other similar expressions, as used in reference to the Contractor, shall mean any combination of acts and omissions that cause the Owner, Construction Manager or Architect to reasonably conclude that the Contractor will not complete the Work within the Contract Time, for the Contract Sum, or in compliance with the requirements of the Contract Documents.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Owner's rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner.

§ 1.6 Notice

§ 1.6.1 Where the Contract Documents require the Contractor to notify or give notice to the Owner or Construction Manager, including a Notice of Claim as provided in Section 15.1.3, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by certified or registered mail, or by courier providing proof of delivery.

(Paragraph deleted)

§ 1.7 Digital Data Use and Transmission

The parties may agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

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(Paragraph deleted)

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work, and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; or (2) a change in the Work materially changes the Contract Sum.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person without prior written notice to and consent of the Owner.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Owner under the Contract Documents, including those required under Section 3.7.1, the Contractor shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner may furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site, but information furnished by the Owner that is not identified as a Contract Document is for informational purposes only and the Owner shall not be liable for inaccuracies or omissions therein, nor shall any inaccuracies or omissions in such items justify an increase in the Contract Sum or relieve the Contractor of its responsibility to perform the Work in accordance with the Contract Documents.

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and necessary to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish the documents electronically and the Contractors shall subscribe and pay for their subscription to the software set forth by the Owner to manage the plans and specifications. .

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

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§ 2.3.9 The Owner shall render decisions and give approvals to the extent required by the Contract Documents. Before performing the Work, the Contractor shall inform the Owner in writing of any information that is necessary for the Contractor's performance of the Work. The Owner's approval or acceptance of, or payment for, any of the Work shall not be construed or operate as a waiver of any right under the Contract or of any cause of action arising out of the performance of the Contract.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within forty-eight (48) hours after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. The Construction Manager or Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If such default or neglect results in an emergency or a threat to person or property, the Contractor shall immediately commence to correct such default or neglect upon receipt of written or oral notice.

§ 2.6 Extent of Owner's Rights

§ 2.6.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner granted in the Contract Documents or at law or in equity.

§ 2.6.2 In no event shall the Owner or Construction Manager have control over, charge of, or responsibility for, construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted in the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate a single representative assigned to the Project who shall be responsible for attending all weekly and other meetings, monitoring schedules and coordinating all activities. The Contractor's representative shall have the authority to commit and bind the Contractor. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. The Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including without limitations (1) the location, conditions, layout and nature of the Project site and surrounding areas, (2) general prevailing climatic conditions, (3) anticipated labor supply and costs, and (4) availability and cost of materials, tools and equipment.

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Neither the Owner nor the Construction Manager assume any responsibility or liability for the physical condition or safety of the Project site, or any improvements located on the Project site; these are solely the responsibility of the Contractor. The Owner shall make no adjustment to the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to comply with this Subparagraph.

.1 The exactness of existing grades, elevations, dimensions and locations given on the Drawings or any document issued by the Construction Manager, the Architect or the Owner, or the work installed by separate contractors, is not guaranteed by the Architect, the Construction Manager, or the Owner.

.2 Mechanical and electrical drawings are diagrammatic only; actual Work shall be installed from approved shop drawings with all measurements obtained at the Project site by the Contractor.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities relating to design (but not means, methods, techniques, sequences and procedures), but the Contractor shall promptly report to the Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require. If additional instructions from the Architect are necessary for the proper execution of the Work, the Contractor shall make a written request for the Architect's interpretation as provided under Article 4. The Work shall be executed in conformity with the Architect's additional instructions and the Contractor shall refrain from any Work relating thereto until the Contractor has received the Architect's additional instructions.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities relating to design (but not means, methods, techniques, sequences and procedures)..

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

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§ 3.3.3 The Contractor shall be responsible for inspection of portions of the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 Within fifteen (15) days after Preconstruction Meeting, the Contractor shall assemble all necessary information and data discussed with the Owner, Architect, and Construction Manager during the post-bid meetings as identified in the Information to Bidders, and submit updated information from those meetings as well as the following:

1. A Schedule of Values in the format and detail required by the Construction Manager.
2. The Contractor's safety program, including HAZCom Program.
3. A complete and detailed submittal schedule.

§ 3.3.5 The Contractor shall furnish to the Construction Manager and the Architect periodic progress reports on the Work in such form as requested by the Construction Manager, including information on the status of materials and equipment which may be in the course of preparation, manufacture or transit. Regularly scheduled progress meetings shall be held weekly, unless otherwise directed.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, all direct jobsite (or "General Conditions") costs, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The Contractor shall provide, maintain, and remove all temporary offices, structures, sheds and storage facilities and all related utilities, gas, telephone, water and restore all areas to their original or intended use to the satisfaction of the Owner. Storage areas for the use of the Contractor shall be designated by the Construction Manager. No materials or products shall be stored except in areas approved by the Construction Manager.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. The Contractor shall remove from the Project any person or entity under the Contractor's control which the Construction Manager or the Owner considers unsatisfactory. The Contractor shall assure harmonious labor relations to prevent delay, disruption, or interference to the Project, and shall prevent strikes, slowdown, work interruptions, jurisdictional disputes and other labor disputes relating to the Work. The Contractor shall require its Subcontractors, material suppliers and other such persons or entities to agree to the provisions of this Section and if any of them fail to fulfill any of the covenants set forth in this Section, the Contractor shall be deemed to be in default under the Contract Documents.

§ 3.4.4 Materials and equipment shall conform to manufacturers' standards and shall be installed in strict accordance with the manufacturers' latest directions. The Contractor shall, if required by the Owner, the Construction Manager or the Architect, furnish satisfactory evidence as to the kind and quality of any materials.

§ 3.4.5 The Contractor shall pay all royalties and license fees relating to the Work.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit and shall be performed in a workmanlike manner and comply with all applicable laws, building codes, rules and regulations. Products incorporated into the Work shall be fit for the purpose for which they are intended and shall be merchantable. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not

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executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. Upon notice from the Owner or the Construction Manager, the Contractor shall, within forty-eight (48) hours following notice from the Owner, Architect or Construction Manager, correct and cure, at the Contractor's expense, all defects and non-conformance in the Work.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 If, within one year after the date of Substantial Completion of Work, or by the terms of a special warranty required by the Contract Documents, any of the Work is found to be defective or non-conforming with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner. The Contractor's warranty excludes defects or damages caused by normal wear and tear during normal usage, use for a purpose for which the Project was not intended, and improper or insufficient maintenance and abuse. This warranty is in addition to all special or extended warranties required by the Contract Documents or otherwise received from the Contractor or any Subcontractor, material supplier or manufacturer. The one year period for correction of defective or non-conforming Work does not constitute a limitation period with respect to the enforcement of the Contractor's other obligations under the Contract Documents and the foregoing warranty shall not affect, limit or impair the Contractor's responsibility for defects in the Work which do not appear within the applicable warranty period. Neither the acceptance of the Work nor any payment shall constitute a waiver of any claims against the Contractor for defective or nonconforming Work, whether latent or apparent, or otherwise act to release or discharge the Contractor from liability.

§ 3.5.4 The Contractor shall indemnify the Owner, the Construction Manager and the Architect against all claims, damages and expenses, including attorney's fees, incurred by the Owner, the Construction Manager or the Architect as a result of the Contractor's failure to abide by its warranty obligations.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the general building permit. The Contractor shall secure and pay for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work. As soon as practicable following commencement of the Work, the Contractor shall furnish the Owner with copies or certificates of all permits and licenses obtained, fees paid and inspections necessary for the proper execution and completion of the Work. All connection charges, assessments, and inspection fees imposed by any governmental agency or utility company are included in the Contract Sum and shall be the Contractor's responsibility.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. The Contractor shall procure and obtain all bonds required of the Owner or the Contractor by the municipality or other public or private body with jurisdiction over the Project and shall prepare all applications, supply all necessary documentation, and furnish the surety with any required personal undertakings. The Contractor shall also obtain and pay all charges for approvals for street closings, parking meter removal, and other similar matters as may be necessary or appropriate for the performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the

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Contract Sum shall be equitably adjusted by Change Order, but only if the Contractor shall promptly provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. Any surveys and other documents describing the physical characteristics, legal limitations or utility locations for the Project site that are not identified as Contract Documents are for informational purposes only and the Owner shall not be liable for inaccuracies or omissions therein, nor shall any inaccuracies or omissions in such items relieve the Contractor of its responsibility to perform the Work in accordance with the Contract Documents.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features under Sections 3.7.4 and 3.7.5 shall be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 Where allowances are required, they will be incorporated in Section 012100 – Allowances. References to Paragraph 3.8 elsewhere in the Contract Documents shall read as referring to that Section in the Specifications.

(Paragraphs deleted)

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

§ 3.9.2 Superintendent shall be satisfactory to the Construction Manager and the Owner, and the Construction Manager and Owner shall have the right to require the Contractor to remove a Superintendent from the Project whose performance is not satisfactory, and replace the Superintendent with a Superintendent who is satisfactory to the Construction Manager and Owner. The Contractor shall not replace the Superintendent without the written consent of the Construction Manager and the Owner.

(Paragraph deleted)

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, within fifteen (15) days of the Pre-Construction Meeting, shall submit for the Owner's and Architect's information, and the Construction Manager's approval, a Contractor's Construction Schedule for the Work. The Construction Schedule shall contain detail appropriate for the Project as required by the Contract Documents, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. In addition, the Construction Schedule shall include a detailed breakdown of the planned duration, start date and completion date for each activity and estimated. The Construction Schedule shall provide for the orderly progression of the Work to completion, shall not exceed time limits under the Contract Documents, shall be related and conform to the Project Schedule, and shall provide for expeditious and practicable execution of the Work. The schedule shall be revised at appropriate intervals as required by the Contract Documents or otherwise required by the conditions of the Work and Project.

§ 3.10.2 The timing of all Work and material and equipment deliveries shall conform to the Project Schedule. The Construction Manager shall have the right to modify the Project Schedule to vary the sequence or suspend, delay, or accelerate the commencement or execution of the Work. The Contractor shall transfer its laborers to such points as directed by the Construction Manager and execute such portions of the Work as may be required to enable other Separate Contractors to properly carry on their work without delay or interference.

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§ 3.10.3 The Contractor shall prepare and keep current for the Construction Manager's and Architect's approval, a schedule of submittals which is coordinated with the Project Schedule and allows the Construction Manager and Architect reasonable time to review submittals.

§ 3.10.4 The Contractor shall perform the Work in conformance with the most recent Project Schedule issued by the Construction Manager.

§ 3.10.5 In the event the Construction Manger determines that the performance of the Work has not progressed, or likely will not progress, to the level of completion required by the Contract Documents, the Construction Manager shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) stacking trades, (3) expediting material deliveries, (4) supplying additional manpower, equipment, and facilities, and (5) other similar measures. Such corrective measures shall continue until the progress of the work complies with the state of completion required or anticipated by the Contract Documents. If the Contractor refuses to take such corrective measures as directed, the Owner may hire others to perform or supplement the Contractor's performance of the Work and deduct all associated costs from the Contract Sum or, to the extent the Contract Sum is insufficient to cover all such associated costs, Contractor shall reimburse the Owner within five (5) days of written demand by Owner.

§ 3.11 Documents and Samples at the Site

(Paragraph deleted)

Refer to Section 017700 – Closeout Procedure, for provisions on this subject. References to Section 3.11 elsewhere in the Contract Documents shall read as referring to Section 017700 in the Specifications.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Refer to Section 013300 – Submittal Procedures, for provisions on this subject. References to Section 3.12 elsewhere in the Contract Documents shall read as referring to Section 013300 in the Specifications.

(Paragraphs deleted)

§ 3.13 Use of Site

§ 3.13.1 Refer to Section 011200 – Multiple Contract Summary, for provisions on this subject. References to Section 3.13 elsewhere in the Contract Documents shall read as referring to Section 011200 in the Specifications.

(Paragraph deleted)

§ 3.14 Cutting and Patching

§ 3.14.1 Refer to Section 017310 – Cutting and Patching, for provisions on this subject. References to Section 3.14 elsewhere in the Contract Documents shall read as referring to Section 017310 in the Specifications.

(Paragraph deleted)

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents,. Construction Manager may impose a $500 per day fine for each day the Contractor fails to clean up to the satisfaction of the Construction Manager. Refer to Specification Section 015690 – Housekeeping and Safety, for provisions on this subject. References to Section 3.15 elsewhere in the Contract Documents shall read as referring to Section 015690 in the Specifications.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located.

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§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner, Architect, or Construction Manager. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager's and Architect's consultants, and agents and employees of any of them from and against claims, causes of action, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance under the Contract Documents, provided that such claim, damage, loss, or expense is (1) attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom, and (2) is caused or contributed to, or is alleged to have been caused or contributed to, in whole or in part, by (a) any negligent act or omission or (b) any act or omission inconsistent with the Contract Documents of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts any of them may be responsible by contract or by law, regardless of whether or not such claim, cause of action, damage, loss, or expense is caused in part by the fault of a party indemnified hereunder. Contractor agrees that the duty to defend shall entitle the indemnitees to approval of the defense counsel. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

§ 3.18.3 Indemnity for Liens/Release of Liens

§ 3.19 Project Construction Wages

§ 3.19.1 The Contractor shall pay wages not less than those established for the Project. Refer to Specification Section 008300 for the established wage for the Project.

§ 3.19.2 The Contractor shall provide a schedule of wages with the Owner and Construction Manager prior to commencing work. The Schedule of Wages shall conform to the requirements set forth in Article 7.2.1 of these amended General Conditions.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

§ 4.1.3 Duties, responsibilities, and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Construction Manager and Architect except as provided in the Owner-Construction Manager or Owner-Architect Agreements. Consent shall not be unreasonably withheld.

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§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest Project Schedule.

§ 4.2.5 The Construction Manager and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor except when necessary to confirm sums owed and payment to Subcontractors or material suppliers, when the Contractor fails to communicate with Subcontractors or material suppliers in an expeditious manner, and when otherwise provided in the Contract Documents. Communications by and with other Contractors shall be through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

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§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those submitted by the Contractor . The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application for Payment or final Project Application for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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§ 4.2.18 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.20 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include other Contractors or Separate Contractors or the subcontractors of other Contractors or Separate Contractors.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. The list of names shall state specifically the portion of the Work to be performed or supplied by each and that person's or entity's contract sum for that portion of the Work. The failure of the Owner to object to any person or entity on the list within ten (10) days shall constitute notice of no reasonable objection. The Contractor shall not accept bids from, any person or entity to whom the Owner has a reasonable objection. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

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§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution. The Contractor shall notify the Owner, Architect, and Construction Manager of the proposed substitution of a Subcontractor a minimum of ten (10) days prior to the proposed change. The Owner may require the Contractor to change a Subcontractor or Sub-subcontractor previously approved and, if the Contractor is in full compliance with the Contract Documents, the Contract Sum shall be increased or decreased by a mutually agreeable amount.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, technical, administrative, procedural, legal and otherwise, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.1 Any portion of the Work performed by a Subcontractor shall be performed pursuant to a written subcontract between the Contractor and Subcontractor. The Construction Manager and the Architect assume no responsibility for reviewing, monitoring, or verifying activities or relationships involving Subcontractors or any lower tiered subcontractors and suppliers or their respective compliance with the Contract Documents.

§ 5.3.2 The Contract Documents shall confer no benefit, right or remedy, either intended or incidental, upon any Subcontractor, design professional, sub-subcontractor, material supplier, equipment lessor or laborer to make claims against the Owner, the Construction Manager or the Architect.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

§ 5.4.2 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity. If the Owner assigns the subcontract to a successor Contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor Contractor's obligations under the subcontract.

(Paragraph deleted)

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Contractor shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with the Contractor.

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§ 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4. A change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by an alteration of or addition to the

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Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 7.1.5 The form and content of all recurring documents (i.e. Change Orders, Proceed Orders, reports, and timesheets) may be designated by the Construction Manager, and the Contractor agrees to use such forms.

§ 7.2 Change Orders

A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

Within seven (7) days of receipt of a requested change, unless requested sooner by the Construction Manager, the Contractor shall advise the Construction Manager of the impact of the change, if any, upon the Contractor's Work, including any adjustment in the Contract Time or the Contract Sum. Failure to so advise the Construction Manager within the specified time period shall constitute a waiver of the Contractor's right to assert a Claim relating to the change.

§ 7.2.1 For each change over $1,000.00, the Contractor shall furnish a detailed, written proposal itemized according to the pricing guidelines set forth below as a condition precedent to the Owner's consideration of a Change Order request. Any Subcontractor, sub-subcontractor and supplier pricing shall also be itemized according to these guidelines. All proposals shall be prepared in the categories and in the order listed below.

.1 Labor – All field labor shall be priced in compliance with any Wage Determination for this Project, excluding labor burden which is covered under subsection .2 below. The payroll is to be based on straight time only and is to include number of hours and rate of pay for each classification of work. If overtime is approved in writing, the Contractor shall list only the straight time portion in this item.

.2 Labor burden – All established payroll taxes, assessments and fringe benefits on the labor under subsection .1 above. This may include, but is not limited to, FICA, Federal and State Unemployment, Health and Welfare, Pension Funds, Worker's Compensation and Apprentice Fund. Each of the fringes shall be listed as a separate line item.

.3 Equipment rentals – All charges for non-owned heavy or specialized equipment at up to 100% of the documented rental cost. No rental charges will be allowed for hand tools, minor equipment, scaffolds, etc. Downtime due to repairs, maintenance and weather delays will not be allowed.

.4 Owned equipment – All charges for owned, heavy or specialized equipment at up to 100% of the cost listed by the Associated Equipment Dealers Blue Book. No recovery will be allowed for hand tools, minor equipment, scaffolds, etc. Downtime due to repairs, maintenance and weather delays will not be allowed.

.5 Trucking – A reasonable delivery charge or per mile trucking charge for delivery of required materials or equipment. Charges for use of a pickup truck will not be allowed.

.6 Overhead – Includes telephone, telephone charges, facsimile, telegrams, postage, photos, photocopying, hand tools, scaffolds (one level high), tool breakage, tool repairs, tool replacement, tool blades, and bits, home office estimating, clerical and account support, home office labor, travel and parking expenses.

.7 Materials – All materials purchased by the Contractor and incorporated into the changed Work, showing costs, quantities, or Unit Prices of all items, as appropriate. Reimbursement for material costs shall only be allowed in the amount of the Contractor's actual cost including any and all discounts, rebates and related credits.

.8 Miscellaneous – The following items are allowable with no overhead and profit:

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(i) The cost of extending the Bond and the cost of extending commercial general liability, builder's risk and specialty coverage insurance.

(ii) The premium portion only for approved overtime (labor and labor burden). The straight time portion is included in subsections .1 and .2 above.

(iii) Fees for permits, licenses, inspections, tests, etc.

.9 Costs which shall not be reimbursed for changed Work include the following:

(i) Employee Retirement and Profit-Sharing Plans, regardless of how defined or described.

(ii) Voluntary Employee Deductions.

.10 The cost of the Contractor's overhead and profit on Change Orders shall be:

(i) For extra Work completed by the Contractor with his own labor, ten percent (10%) shall be added to Items .1, .2, .3, .4, .5, and .7 of Section 7.2.1 as an allowance for overhead and profit.

(ii) For extra Work completed by Subcontractors of the Contractor, five percent (5%) shall be added to Items. .1, .2, .3, .4, .5, and .7 of Section 7.2.1 as an allowance for overhead and profit.

§ 7.2.2 The Owner, the Construction Manager and the Architect shall be permitted to review, audit and copy the Contractor's records relating to Change Order proposals, Change Orders and changed work (whether based on lump sum, unit prices, or costs) upon reasonable notice and during normal business working hours throughout the term of this Agreement and for a period of three (3) years after final payment or longer if required by law or the Contract Documents. "Records" shall include any and all information, materials and data of every kind and character (hard copy as well as computer readable data) that may, in the Owner's, the Construction Manager's or the Architect's judgment, have any bearing on or pertain to the pricing of changed, added or deleted Work and the accuracy of the Contractor's representations regarding pricing and claims information submitted by the Contractor. If an audit or examination in accordance with this Section disclosed overcharges by the Contractor, the cost of the audit shall be immediately reimbursed by the Contractor in addition to the overcharges.

§ 7.2.3 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including but not limited to all direct and indirect costs associated with such change, claims based on the cumulative impact of changes, and any and all other adjustments to the Contract Sum and the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

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.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data.
(Paragraphs deleted)

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 The Contractor shall not engage in the practice of inflating Change Order proposals or costs under Article 7 (generally known as buyouts) by submitting Subcontractor prices that are higher than the Contractor's actual known Subcontract costs. Each component of a Change Order proposal affecting the Contract Sum shall be supported by an underlying cost element and documentation evidencing actual costs. Where a Subcontract price has been obtained that is lower than what was submitted in an original Change Order proposal (for whatever reason or through whatever means), the Contractor shall pass along such savings to the Owner. If the lower price is obtained prior to the execution of a Change Order, such savings shall be incorporated into the proposed Change Order prior to execution. If a Change Order has already been executed, a deductive Change Order shall be issued to the Owner for the difference.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

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ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not, except by instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. The timing of all Work and material and equipment deliveries shall conform to the Project Schedule.

§ 8.2.4 The Owner and the Construction Manager shall have the right to modify the Project Schedule to vary the sequence or suspend, delay, or accelerate the commencement or execution of the Work. The Contractor shall transfer its laborers to such points as directed by the Construction Manager and execute such portions of the Work as may be required to enable Contractors to properly carry on their work without delay or interference.

§ 8.2.5 If the Contractor should (1) fail, refuse or neglect to supply a sufficient number of workers or deliver materials or equipment with such promptness as to prevent delay in the progress of the Work; (2) fail to commence and diligently prosecute the Work and proceed to the point to which the Contractor should have proceeded in accordance with the Project Schedule in order to achieve Substantial Completion in accordance with the Project Schedule; or (3) fail to commence, prosecute, finish, deliver or install the different portions of the Work in accordance with the Project Schedule, the Construction Manager shall have the right to direct the Contractor to prepare a written plan, for the Owner's approval, to accelerate the Work to comply with the Project Schedule, including, without limitation, providing additional labor, expediting deliveries of materials and equipment, performing overtime and/or resequencing the Work, without an increase in the Contract Sum. Upon the Owner's approval of the acceleration plan, the Contractor shall accelerate the Work in accordance with the plan. The Contractor shall compensate the Owner for, and indemnify the Owner against, all damages, losses and expenses, including additional compensation of the Construction Manager and the Architect, and attorney's fees, proximately resulting from the acceleration of Contractor's Work.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such the period of time lost on the critical path of Contractor's Work as shown on the Project Schedule ("Excusable Event of Delay"). The phrase "Excusable Event of Delay" does not include delays or disruptions in the performance of Work arising from or related to, in whole or in part: (1) inadequate construction forces or general labor shortages; (2) conditions within the Contractor's knowledge at the time of executing the Agreement, (3) inadequate labor forces,(4) failure of the Contractor to place orders for equipment or materials sufficiently in advance to insure timely delivery or (5) Contractor's failure to perform its Work in accordance with the Contract Documents..

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§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Claims requesting an increase in the Contract Time or the Contract Sum as a result of an Excusable Event of Delay shall be made in accordance with applicable provisions of Section 15.1.3, except that the Claim(s) must be made within five (5) days from the date that the Excusable Event of Delay begins. The Claim shall notify the Owner and Construction Manager, in writing, of all facts then available to the Contractor relative to the nature and extent of the Excusable Event of Delay, and its anticipated effect, (if any) upon the time or date established for Substantial Completion of the Work. Construction Manager will promptly acknowledge the Contractor's request for extension of time, but Construction Manager need not make a determination concerning the same until the nature and extent of the delay and its related impact upon the Contract Time for completion of the Work is determined. The Contract Time may be increased by Change Order as set forth in Section 15.1.6. The notice requirements of this Section are a condition precedent to the relief contemplated under Section 8.3 and if the Contractor fails to comply with these requirements, the Contractor shall be deemed to have waived the claim.

(Paragraph deleted)

§ 8.3.3. If the Contractor's Work or the Project is delayed by any act or omission of the Contractor or any person or entity for whom the Contractor is responsible, or by acts, omissions, events, or occurrences that are not a result of an Excusable Event of Delay, the Contractor shall (1) be assessed liquidated damages if provided for in the Contract, or (2) if liquidated damages are not provided for in the Contract, compensate the Owner for, and indemnify the Owner against, all damages, losses and expenses, including additional compensation of the Construction Manager and the Architect, and attorney's fees, proximately caused by such inexcusable delay.

§ 8.3.4 The Contractor's sole remedy for any delay or disruption in the commencement, prosecution, or completion of the Work, disruption to or interference with the performance of the Work, loss of productivity, or other similar claims, whether or not foreseeable, shall be an increase in the Contract Time pursuant to Sections 8.3.1 and 8.3.2 and an increase in the Contract Sum, but only for and to the extent of an increase in the Contractor's General Conditions directly associated with the increase in the Contract Time afforded under Sections 8.3.1 and 8.3.2. The Owner's, Construction Manager's, or the Architect's exercise of the right to make changes in the Work or to require the correction of damaged, defective or non-confirming Work shall not under any circumstances be construed an Excusable Event of Delay. In no event shall the Contractor be entitled to any compensation or the recovery of any damages in connection with any such claims, including consequential or incidental damages, lost opportunity costs, impact damages, or other similar remuneration. If the Contractor submits a progress report indicating, or the Contractor otherwise expresses an intention to achieve, completion of the Work prior to any completion date required by the Contract or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created, implied or permitted.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Within fifteen (15) days of the Preconstruction Meeting, or as otherwise required by Division 1 of the Project Manual, the Contractor shall submit a schedule of values to the Construction Manager, before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect, including a complete billing breakdown on AIA Form G-703, or similar form provided by the Construction Manager, prepared in such form and supported by such data as the Construction Manager or the Architect may require. The form shall be divided in detail sufficient to identify specific divisions of the Work and shall be updated as required by the Construction Manager to reflect (1) description of Work (listing labor and material separately), (2) total value, (3) percent of the Work completed to date, (4) value of Work completed to date, (5) percent of previous amount billed, (6) previous amount billed, (7) current percent completed, and (8) value of Work

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Completed to date. Any breakdown that fails to include sufficient detail is unbalanced or exhibits "front-loading" of the value of the Work, shall be rejected. Once approved by the Owner, these documents shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment. Each subsequent Application for Payment must be accompanied by an updated billing breakdown. If a breakdown is approved and subsequently used but is later found improper for any reason, sufficient funds shall be withheld from future Applications for Payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Work.

§ 9.3 Applications for Payment

§ 9.3.1 Based upon an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. The Owner shall make progress payments to the Contractor as provided below and elsewhere in the Contract Documents. The period covered by each Application for Payment shall be one calendar month ending on the last day of the month. The Application for Payment must be prepared in duplicate on AIA Form G-732 and G-703, or similar form provided by the Construction Manager, and shall indicate the percentage of completion of each portion of the Work as the end of the period covered by the Application for Payment. Each Application for Payment shall be accompanied by the following, all in form and substance satisfactory to the Construction Manager and Owner: (1) A lien waiver and duly executed and acknowledged sworn statement showing all Subcontractors, sub-subcontractors, and suppliers, the amount of each Subcontract, the amount requested for any Subcontractor and supplier in the requested progress payment, and the amount to be paid by the Contractor from such progress payment; (2) executed lien waivers from all Subcontractors, sub-subcontractors, and suppliers establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment; and (3) all information and materials required to comply with the requirements of the Contract Documents. Any detailed or supplemental information requested by the Construction Manager or the Architect shall be supplied by the Contractor.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing but payment to the Contractor for materials stored off site generally will not be recommended by the Construction Manager. Where circumstances indicate that the Owner's best interest will be served by payment for off-site storage, the Contractor shall make written request to the Construction Manager for approval to include such costs in the Contractor's next Application for Payment. The Contractor's request shall include the following information:

.1 A list of the fabricated materials (which shall be clearly identified), giving the place of storage together with copies of invoices and reasons why materials cannot be delivered to the Project site.

.2 Certification that the materials have been tagged for delivery to the Project and that they will not be used for another purpose.

.3 A letter from the Contractor's Surety indicating agreement to the arrangements and that payment to the Contractor shall not relieve either party of their responsibilities under the Contract Documents.

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.4 Evidence of adequate insurance covering the material in storage which shall name the Owner as additional insured.

The costs incurred by the Construction Manager and Architect to inspect material in off-site storage shall be paid by the Contractor. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site. If payment is made for materials or equipment stored off-site, title shall pass to the Owner, but the Contractor shall remain fully liable for all such material and equipment until incorporated in the Project.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment (1) all Work for which Applications for Payment have been previously recommended for payment and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work, (2) the Work covered by the Application for Payment has been completed in accordance with the Contract Documents, (3) the current payment shown is now due, (4) except as set forth in the Application for Payment, no additional amounts are due, (5) all amounts have been paid by the Contractor for Work for which previous payments have been received, (6) the Contractor has complied with and paid all amounts due under federal, state and local tax laws, including social security, unemployment compensation and worker's compensation laws, and (7) the remaining balance of the Contract Sum is sufficient to complete the Work free and clear of all liens and encumbrances.

§ 9.4 Recommendations for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a recommendation for payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a recommendation for payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding recommendation in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding recommendation.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and recommend the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and recommendation for payment; (4) recommend the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and recommendation for payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project recommendation for payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project recommendation for payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding recommendation in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding recommendation in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding recommendation to the Contractors.

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§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and recommendation for payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's recommendation will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount recommended.

§ 9.4.4 The Architect's issuance of a recommendation for payment or, in the case of more than one Contractor, Project or a Project recommendation for payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount recommended.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a recommendation for payment or a Project recommendation for payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Recommendation

§ 9.5.1 The Construction Manager or Architect may withhold a recommendation for payment or Project recommendation for payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to recommend payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a recommendation for payment or a Project recommendation for payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a recommendation for payment or, because of subsequently discovered evidence, may nullify the whole or a part of a recommendation for payment or Project recommendation for payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from

.1 defective or nonconforming Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials, services or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a Separate Contractor or other Contractor or other third-parties who could make a claim against the Owner;

.6 reasonable evidence that the Work will not be completed within the Contract Time or a Milestone Date, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 failure to comply with the requirements of the Contract Documents or carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the reasons for withholding recommendation are removed, certification will be made for amounts previously withheld with the next Application for Payment that includes such amounts previously withheld.

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§ 9.5.3 The Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier and charge such payment against the Contract Sum.

(Paragraph deleted)

§ 9.6 Progress Payments

§ 9.6.1 The Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Construction Manager and Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. If any payment claim or lien is made or filed with or against the Owner or the Project, the Contractor shall, within twenty (20) days of the filing of the lien or submission of the claim, satisfy, discharge or bond-off the claim or lien, cause the Owner to be dismissed from any action which may be brought in connection with the claim or lien, and compensate the Owner for, and indemnify the Owner against, any and all losses, damages, and expenses, including attorney's fees, sustained or incurred by the Owner.

§ 9.6.3 The Construction Manager may, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Contractor shall pay for all labor, materials, equipment and services through the period covered by the previous payment received from the Owner, and shall furnish satisfactory evidence, including (as a condition precedent to payment) releases and lien waivers on forms provided by the Owner, to verify compliance with this requirement. The Owner has the right to request additional written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 Any payment, including a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor (unless required by applicable law), create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. The Contractor shall substitute a surety bond for the property against which the lien or other claim for payment has been asserted promptly upon the demand of the Owner. If Owner incurs any costs, expenses, damages, including reasonable attorneys' fees, to cause the release of any such lien, Contractor shall immediately reimburse Owner or said amounts shall be deducted from the Contract Sum.

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§ 9.7 Failure of Payment

If the Owner does not pay the Contractor within fourteen (14) days after the date established in the Contract Documents, the amount due the Contractor, the Contractor may, upon fourteen (14) additional days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use provided, however, that as a condition precedent to Substantial Completion, the Owner has received all certificates of occupancy and any other permits, approvals, licenses and other documents from any governmental authority having jurisdiction over the Project that are necessary for the beneficial occupancy and use of the Project.

§ 9.8.1 Project Closeout includes those activities leading to Substantial Completion and Final Completion of the Work. Project Closeout activities and requirements are specified in Division 1, Section 017700 – "Contract Closeout" of the Manual. To administer and conduct Project Closeout, the Contractor shall indicate a designated value as specified in Division 1, Section 012800 – Schedule of Values of this manual.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion. If, upon the Architect's completion of the initial inspection, there remains incomplete or unsatisfactory Work, the Contractor will be back-charged for the time expended by the Architect and Construction Manager for additional inspections.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction Manager and Architect shall execute, a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Construction Manager has assigned to the Owner and Contractor the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2.

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§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final recommendation for payment or Project recommendation for payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final recommendation is due and payable. The Construction Manager's and Architect's final recommendation for payment or Project recommendation for payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied in the form of AIA Document G706, "Contractor's Affidavit of Payment of Debt and Claims," (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment in the form of AIA Document G707, "Consent of Surety Company to Final Payment," (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, (7) a certificate stating that no materials containing asbestos were incorporated into the Work, (8) all warranties, guarantees, record drawings, and other close-out documents required by the Contract Documents, and (9) such evidence as may be necessary to show that any out-of-state Subcontractor or supplier has fully met the requirements for payment of taxes as established by the laws of the state or local subdivision in effect at the time of final payment. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 Final payment, including retainage or escrowed principal and escrowed income by the escrow agent, shall be paid to the Contractor no less than sixty (60) days following the date of Substantial Completion. If at that time there remain defective, non-conforming or incomplete items of Work, an amount equal to 200% of the value of each item as determined by the Construction Manager and Architect shall be withheld until said items are completed. If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner may, upon application by the Contractor , and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

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§ 9.10.4

(Paragraphs deleted)

Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

(Paragraph deleted)

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
- **.4** construction or operations by the Owner, Separate Contractors, or other Contractors.
- **.5** excavations, trenches, buildings and grounds from all water damage, including the use of temporary drainage to keep excavations free of water
- **.6** benchmarks, monuments and other reference points affected by the Work, including re-establishment of benchmarks, monuments or other references point and the resetting of markers which are displaced or destroyed, all under the supervision of a licensed surveyor who shall furnish certificates of its work; and
- **.7** the structural components of the Project by assuring safe erection procedures and sequences and the use of temporary bracing, guys and tie-downs as may be prudent

The Contractor acknowledges that the safety of the Owner's students, employees, and guests is of the utmost importance. The Contractor shall take no action which would jeopardize the safety of the Owner's students, employees or guest and, shall take no action which would interfere with the Owner's activities, without the Owner's written approval.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss. In addition, the Contractor shall comply with the safety requirement of Division 1 of the Specifications and other safety requirements and regulations set forth elsewhere in the Contract Documents.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property and improvements adjacent to the Project. Any damage to such property or improvements shall be promptly repaired by the Contractor. Without limiting the indemnity provisions contained elsewhere in the Contract Documents, the Contractor shall indemnify and hold the Owner harmless from and against any and all actions or damages resulting from damage to such property or improvements.

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§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents and who shall cooperate with the Contractors or Separate Contractors to the extent necessary to promote Project safety. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect. A safety representative employed by the Owner or an insurer may, from time to time, conduct safety inspections and submit safety findings. The Contractor shall, at its expense, implement any abatement procedures recommended by such safety representative.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume. By Change Order, the Contract Time shall be extended as set forth in Section 8.3.1 and the Contract Sum shall be increased as set forth in Section 8.3.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim,

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damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 Hazardous material shall not be used without the prior written consent of the Construction Manager. If hazardous material are of a type of which an employer is required by law to notify its employees, Subcontractors or anyone directly or indirectly employed by them, the Contractor shall, prior to the possible exposure to such substances, give written notice of the detailed chemical composition thereof to the Construction Manager. The Contractor, in addition to products banned as part of the Clean Air Act (40 CFR 60, Subpart M), shall not use or bring on site materials containing more than 1% asbestos by content. No materials marked as "MAY CONTAIN MINERAL FIBERS" shall be used in construction unless written results of microscopic examination by an AIHA or NVLP certified laboratory documenting the asbestos content at less than 1% by weight are provided to the Construction Manager and approved before installation. If materials containing more than 1% asbestos content are brought onto the Project site by the Contractor, the materials shall be removed in accordance with all applicable laws and precautions so as not to make fibers friable. Removal of materials containing more than 1% asbestos and replacement of such materials shall be at the Contractor's expense. Prior to Final Payment, the Contractor shall submit to the Owner a signed and notarized copy of the following statement: "I hereby certify to the best of my knowledge no asbestos containing material (ACM) above 1% content was used as a building material for this Project." The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.3.7 A "hazardous material or substance" is any substance or material identified as hazardous under any federal state or local law or regulation, or any other substance or material that may be considered hazardous or otherwise subject to statutory or regulatory requirement governing handling, disposal and/or cleanup.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies rating A+ VII, A VII or A- VII by A. M. Best and lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Construction Manager and Construction Manager's consultants, and the Architect and Architect's consultants, shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and in writing, prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 If permitted by the Owner's insurance company without penalties the Owner, the Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent of actual recovery under any property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive

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claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor, Architect, and Construction Manager for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and

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inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. If the Contractor fails to correct defective or non-conforming Work within two (2) calendar days after receipt of written notice from the Owner, the Construction Manager or the Architect, the Owner may make good the deficiencies and the cost shall be charged to the Contractor. If payments due the Contractor are not sufficient to cover the cost, the Contractor shall pay the difference to the Owner.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 or the Contract Documents shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 and Section 3.5 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made. The acceptance of nonconforming Work by the Owner shall be by written Change Order, signed by the Owner's authorized representative. No other person or entity has authority to accept nonconforming Work.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

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§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Except as expressly provided in the Contract Documents, duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until the effective date of the Contract. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense. The Contractor also agrees that the cost of testing services required for the convenience of the Contractor in its scheduling and performance of the Work, and the cost of testing services related to remedial operations performed to correct deficiencies in the Work, shall be borne by the Contractor.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect and the Construction Manager.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

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§ 13.4.7 Neither the observations of the Architect nor Construction Manager in their administration of the Contract Documents, nor inspections, tests or approvals by persons other than the Contractor shall relieve the Contractor of its obligation to perform the Work in accordance with the Contract Documents.

§ 13.5 Interest

Unless otherwise expressly provided in the Contract Documents, payments due and unpaid under the Contract Documents shall bear no interest. If interest is expressly provided for in the Contract Documents, then such interest shall apply only with respect to liquidated and undisputed payment amounts due, and shall only accrue from and after the tenth (10th) day following the Owner's receipt of a notice containing an express statement by the Contractor of its intention to assess interest. In the event the Owner is entitled to withhold payment under the Contract Documents or by law, or in the event of a good faith dispute between the Owner and the Contractor, no interest shall accrue.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped; or

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped.

(Paragraphs deleted)

(Paragraph deleted)

§ 14.1.3 If one of the reasons described in Section 14.1.1 exists, the Contractor may, upon seven days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for the cost of the Work executed and accepted, as well as reasonable overhead and profit on Work executed and accepted by Owner, and actual costs incurred solely by reason of such termination. Recovery by the Contractor of lost anticipated profits and other incidental or consequential damages are specifically excluded.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents;

.5 fails in any material respect to prosecute the Work according to Project Schedule or causes delay to, disruption of, or interference with the work of any other Contractor; or

.6 files bankruptcy or makes a general assignment for the benefit of creditors, or if a receiver is appointed over the Contractor.

In the event any termination of the Contractor for default is later determined to have been improper, the termination shall automatically convert to a termination for convenience, and the Contractor shall be limited in its recovery strictly to the compensation provided for in Section 14.4.3 below.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager or the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and

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the Contractor's surety, if any, forty-eight (48) hours' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses (including reasonable attorneys' fees) made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine upon forty-eight (48) hours written notice to the Contractor. The Contractor shall resume the Work as directed by the Owner or the Construction Manager. If the Project is resumed after being suspended for more than ninety (90) days, the Contract Sum shall be equitably adjusted.

(Paragraphs deleted)

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed, plus a reasonable markup for overhead and profit on Work performed and accepted. The Contractor shall make its records available for the Owner's, the Construction Manager's and the Architect's review; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by the Contractor seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the Contractor. This Article 15 shall not grant or enlarge upon the Contractor's right to make claims that are otherwise modified, disclaimed or waived by the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law,

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but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 The Contractor shall make all claims for an increase in the Contract Sum or the Contract Time in accordance with the Contract Documents and in strict compliance with the procedures provided below. If the Contractor claims that it is entitled to additional sums or time, for any reason whatsoever, the Contractor shall give the Owner, the Construction Manager and the Architect written notice of the claim within ten (10) days after the occurrence giving rise to the claim or within ten (10) days after the Contractor first recognizes the condition giving rise to the claim, whichever is later. The notice of the claim shall set forth the circumstances giving rise to the claim, and to the extent reasonably available, facts, documents, backup data and other information supporting the claim and the relief sought. Failure by the Contractor to provide written notice of the claim shall result in a waiver of the claim. Within thirty (30) days after providing written notice of a claim, the Contractor shall submit complete support for the claim including, without limitation, documents, backup data and other information supporting the claim, the relief sought, and those persons with knowledge of the claim. No additional sums shall be paid to the Contractor, and no additional time shall be granted or recognized, unless the Contractor has received a written Change Order signed by the Owner, the Construction Manager and the Architect. VERBAL CHANGES OR EXTRAS SHALL NOT BE VALID OR ENFORCEABLE.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15.

§ 15.1.5 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages. The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- **.1** damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- **.2** damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

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§ 15.1.8 The Contractor shall not knowingly present or cause to be presented a false or fraudulent Claim. As a condition precedent to making a Claim, the Claim shall be accompanied by an affidavit sworn to before a notary public or other person authorized by law to administer oaths and executed by an authorized representative of the Contractor which states stat: "This Claim complies with Article 15 of the General Conditions, which provides that the Contractor shall not knowingly present or cause to be presented a false or fraudulent Claim."

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Construction Manager will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. The Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days of receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

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§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract shall be subject to mediation as a condition precedent to litigation.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation.

(Paragraph deleted)

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

(Paragraphs deleted)

ARTICLE 16 EQUAL OPPORUNITY

§ 16.1 The Contractor and Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to, employment, upgrading, demotion, or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth these policies of non-discrimination.

§ 16.2 The Contractor and Subcontractors shall, in solicitations or advertisements for employees placed by them or on their behalf, state that qualified applicants will receive consideration for employment without regard to race, religion, color, sex, or national origin.

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SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
   2. Alternates described in this Section are part of the Work only if enumerated in the Agreement.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Provide alternative Regenerative DE Filter System for all pools in lieu of specified system. System must be by a single manufacturer. Refer to Specification Section 13 15 00 for additional information on system requirements. Base Bid must include products as identified in Section 13 15 00.

   Identify System Manufacturer on Bid Form.

B. Alternate No. 2: Provide alternative Chemical Feeders, Tablet Chlorine and Tablet PH Feed System, in lieu of specified system. System must be by a single manufacturer. Refer to Specification Section 13 15 00 for additional information on system requirements. Base Bid must include products as identified in Section 13 15 00.

   Identify System Manufacturer on Bid Form.

C. Alternate No. 3: Provide alternative Fiberglass Bulkhead Assembly in lieu of specified system. Bulkhead must be by a single manufacturer. Refer to Specification Section 13 15 00 for additional information on bulkhead requirements. Base Bid must include products identified in Section 13 15 00.

Identify Bulkhead Manufacturer on Bid Form.

D. Alternate No. 4: Provide alternative Ultraviolet System in lieu of specified system. System must be by a single manufacturer. Refer to Specification Section 13 15 00 for additional information on system requirements. Base Bid must include products as identified in Section 13 15 00.

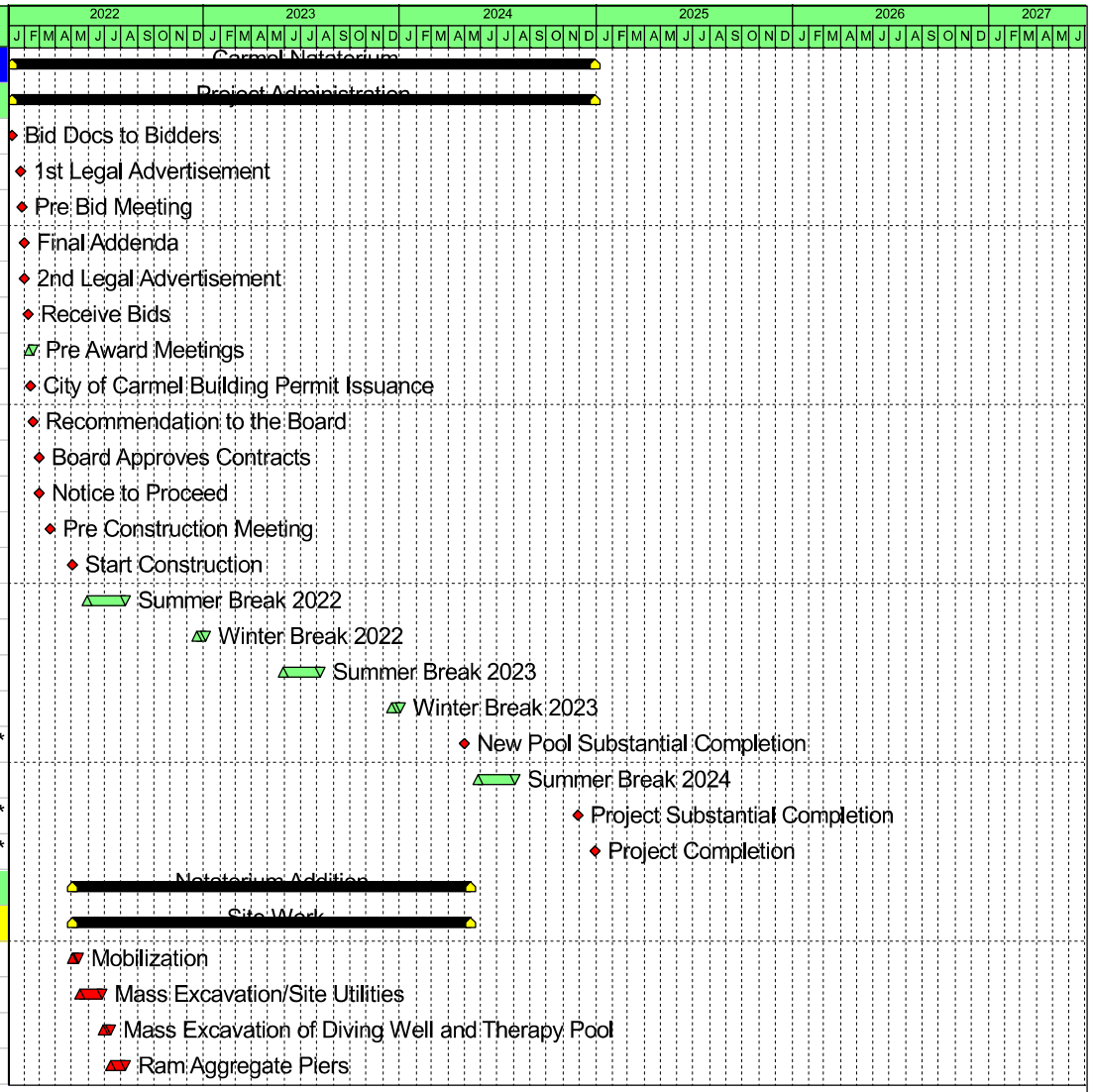
Identify System Manufacturer on Bid Form.

E. Alternate No. 5: Provide alternative Chemical Controller System in lieu of specified system. System must be by a single manufacturer. Refer to Specification Section 13 15 00 for additional information on system requirements. Base Bid must include products as identified in Section 13 15 00.

Identify System Manufacturer on Bid Form.

END OF SECTION 01 23 00

Activity Name	Original Duration	Start	Finish
Carmel Natatorium	768	10-Jan-22	31-Dec-24
Project Administration	768	10-Jan-22	31-Dec-24
Bid Docs to Bidders	0		10-Jan-22*
1st Legal Advertisement	0		26-Jan-22*
Pre Bid Meeting	0		28-Jan-22
Final Addenda	0		01-Feb-22*
2nd Legal Advertisement	0		02-Feb-22*
Receive Bids	0		09-Feb-22*
Pre Award Meetings	5	11-Feb-22	17-Feb-22
City of Carmel Building Permit Issuance	0	14-Feb-22*	
Recommendation to the Board	0		18-Feb-22*
Board Approves Contracts	0		28-Feb-22*
Notice to Proceed	0	02-Mar-22*	
Pre Construction Meeting	0	23-Mar-22	
Start Construction	0	02-May-22*	
Summer Break 2022	50	31-May-22*	09-Aug-22
Winter Break 2022	13	19-Dec-22*	06-Jan-23
Summer Break 2023	50	29-May-23*	07-Aug-23
Winter Break 2023	13	18-Dec-23*	03-Jan-24
New Pool Substantial Completion	0		01-May-24*
Summer Break 2024	50	27-May-24*	02-Aug-24
Project Substantial Completion	0		29-Nov-24*
Project Completion	0		31-Dec-24*
Natatorium Addition	523	02-May-22	13-May-24
Site Work	523	02-May-22	13-May-24
Mobilization	10	02-May-22	13-May-22
Mass Excavation/Site Utilities	30	16-May-22	27-Jun-22
Mass Excavation of Diving Well and Th	10	28-Jun-22	12-Jul-22
Ram Aggregate Piers	20	13-Jul-22	09-Aug-22



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

Carmel Natatorium

Guideline Schedule 01-Jan-22

SKILLMAN

Activity Name	Original Duration	Start	Finish
Final Grading	15	05-Oct-23	25-Oct-23
Curbs and Walks	25	26-Oct-23	29-Nov-23
Landscaping	20	19-Mar-24	15-Apr-24*
Paving	20	16-Apr-24	13-May-24
Core & Shell	355	16-May-22	04-Oct-23
Unit N Natatorium	295	10-Aug-22	04-Oct-23
Footings/Foundations	30	10-Aug-22	21-Sep-22
Structural Steel	80	22-Sep-22	17-Jan-23
Interior Masonry	60	19-Dec-22	14-Mar-23
Pool Trusses	20	15-Mar-23	11-Apr-23
Exterior Masonry	60	12-Apr-23	05-Jul-23
Slab on Deck	20	12-Apr-23	09-May-23
Barrel Roof Natatorium	40	10-May-23	05-Jul-23
Bleacher Deck	40	10-May-23	05-Jul-23
Kalwall	30	06-Jul-23	16-Aug-23
Aluminum Storefront / Curtainwall	25	06-Jul-23	09-Aug-23
Architectural Metal Panels	40	10-Aug-23	04-Oct-23
Unit N Pool Equipment/Storage	95	22-Sep-22	07-Feb-23
Footings/Foundations	20	22-Sep-22	19-Oct-22
Structural Steel	30	20-Oct-22	02-Dec-22
Masonry	20	05-Dec-22	03-Jan-23
Roof	25	04-Jan-23	07-Feb-23
Unit N New Entry	318	16-May-22	14-Aug-23
Building Demolition	20	16-May-22	13-Jun-22
Site Demolition and Excavation	5	14-Jun-22	20-Jun-22
Partial Footings/Foundations	15	21-Jun-22	12-Jul-22
Underground Plumbing	5	21-Jun-22	27-Jun-22
Temporary Enclosure and Egress Fra	20	13-Jul-22	09-Aug-22
Remaining Footings/Foundations	10	15-May-23*	26-May-23



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

Carmel Natatorium

Guideline Schedule 01-Jan-22

SKILLMAN

Activity Name	Original Duration	Start	Finish
Structural Steel / Steel Stairs	15	29-May-23	16-Jun-23
Masonry	15	19-Jun-23	10-Jul-23
Slab on Deck / Concrete Pain Stairs	5	19-Jun-23	23-Jun-23
Roof	25	11-Jul-23	14-Aug-23
Aluminum Storefront	10	11-Jul-23	24-Jul-23
Interior Build Out	445	10-Aug-22	01-May-24
Unit N Pool Area	440	10-Aug-22	24-Apr-24
Overhead MEP	60	12-Apr-23	05-Jul-23
Paint the Deck	15	06-Jul-23	26-Jul-23
Wall Painting	20	20-Jul-23	16-Aug-23
Metal Ceilings	25	17-Aug-23	20-Sep-23
Pool Lighting	25	31-Aug-23	04-Oct-23
Acoustical Panels	20	05-Oct-23	01-Nov-23
Bleacher Seating	30	05-Oct-23	15-Nov-23
Pool Scoreboards	10	05-Oct-23	18-Oct-23
Architectural Handrails	20	05-Oct-23	01-Nov-23
Pool Sound System	20	19-Oct-23	15-Nov-23
Pool Equipment	15	14-Mar-24	03-Apr-24
Fill Pools	10	14-Mar-24	27-Mar-24
Stabilize/Test Water Chemicals	20	28-Mar-24	24-Apr-24
Therapy Pool and Diving Well	410	10-Aug-22	13-Mar-24
Therapy Pool and Diving Well Pipin	50	10-Aug-22	19-Oct-22
Therapy Pool and Diving Well Conc	20	29-May-23	23-Jun-23
30 Day Concrete Cure Time	30	26-Jun-23	07-Aug-23
Therapy and Diving Pool Tile	50	17-Aug-23	25-Oct-23
30 Day Cure for Tile	30	26-Oct-23	06-Dec-23
Therapy and Diving Well Deck Floo	25	21-Dec-23	24-Jan-24
Competition Pool	240	12-Apr-23	13-Mar-24
Competition Pool Piping and Conc	40	12-Apr-23	06-Jun-23
Pool Deck Concrete	30	07-Jun-23	19-Jul-23



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

Carmel Natatorium

Guideline Schedule 01-Jan-22

SKILLMAN

Activity Name	Original Duration	Start	Finish
30 Day Concrete Cure Time	30	20-Jul-23	30-Aug-23
Competition Pool Tile	40	26-Oct-23	20-Dec-23
30 Day Cure for Tile	30	21-Dec-23	31-Jan-24
Competition Pool Deck Flooring	35	25-Jan-24	13-Mar-24
Unit N Looker Rooms	**215**	**06-Jul-23**	**01-May-24**
Interior Masonry Walls	30	06-Jul-23	16-Aug-23
Underground Plumbing	40	27-Jul-23	20-Sep-23
Slab on Grade	20	21-Sep-23	18-Oct-23
MEP Rough in	40	19-Oct-23	13-Dec-23
Painting	20	30-Nov-23	27-Dec-23
Ceilings/Lighting	30	28-Dec-23	07-Feb-24
Lockers	15	08-Feb-24	28-Feb-24
Toilet Partitions/Plumbing Fixtures	20	08-Feb-24	06-Mar-24
Flooring	30	29-Feb-24	10-Apr-24
Doors/Hardware	15	11-Apr-24	01-May-24
Accessories	15	11-Apr-24	01-May-24
Washers/Dryers	5	11-Apr-24	17-Apr-24
Unit N Lower Concourse	**160**	**21-Sep-23**	**01-May-24**
Underground Plumbing	15	21-Sep-23	11-Oct-23
Slab on Grade	20	12-Oct-23	08-Nov-23
Overhead Elec/Mechanical	25	09-Nov-23	13-Dec-23
Metal Studs and Drywall	25	14-Dec-23	17-Jan-24
Painting	15	18-Jan-24	07-Feb-24
Acoustical Ceilings/Lighting	25	08-Feb-24	13-Mar-24
Ceiling Clouds/Lighting	20	14-Mar-24	10-Apr-24
Flooring/Doors/Hardware	15	11-Apr-24	01-May-24
Unit N Upper Level	**135**	**12-Oct-23**	**17-Apr-24**
Overhead Electrical and Mechanical	20	12-Oct-23	08-Nov-23
Interior Masonry Walls	20	09-Nov-23	06-Dec-23



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

SKILLMAN

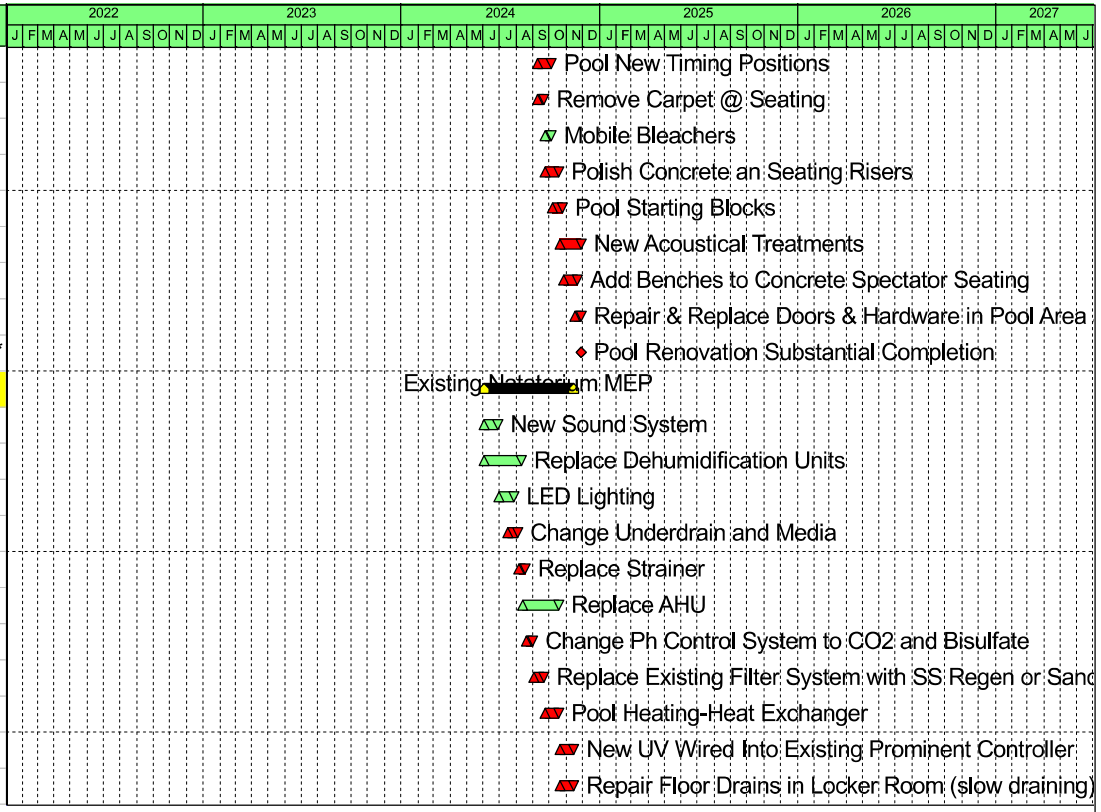
Activity Name	Original Duration	Start	Finish
Paint Deck	10	09-Nov-23	22-Nov-23
Metal Studs and Drywall	25	07-Dec-23	10-Jan-24
Paint Walls	15	11-Jan-24	31-Jan-24
Acoustical Ceilings and Lights	20	01-Feb-24	28-Feb-24
Acoustical Clouds and Lights	20	29-Feb-24	27-Mar-24
Toilet Partitions and Plumbing Fixture	20	29-Feb-24	27-Mar-24
Flooring/Doors/Hardware	15	28-Mar-24	17-Apr-24
Unit N Entry	154	05-Jun-23	05-Jan-24
Slab on Grade	5	05-Jun-23	09-Jun-23
Interior Masonry	30	12-Jun-23	24-Jul-23
Overhead Electrical/Mechanical	30	26-Jun-23	07-Aug-23
Painting	5	18-Dec-23*	22-Dec-23
Acoustical Ceilings/Lighting	5	25-Dec-23	29-Dec-23
Flooring/Doors/Hardware	5	01-Jan-24	05-Jan-24
Unit N Pool Mech Room	120	08-Feb-23	26-Jul-23
Pool Pumps/Boilers/Piping	120	08-Feb-23	26-Jul-23
Existing Natatorium Renovation	130	03-Jun-24	29-Nov-24
Existing Natatorium Building Envelope	115	03-Jun-24	08-Nov-24
Re Roof Existing Natatorium	70	03-Jun-24	06-Sep-24
Replace Translucent Panels	30	09-Sep-24	18-Oct-24
Replace Doors and Hardware	15	21-Oct-24	08-Nov-24
Existing Natatorium Pool Reno	130	03-Jun-24	29-Nov-24
Repair Corrosion & Paint Existing Struc	30	03-Jun-24	12-Jul-24
Pool Renovation Mobilization	0	03-Jun-24*	
Paint Wall Surfaces (including Pool Eq	20	15-Jul-24	09-Aug-24
Tank Tile Repair	40	15-Jul-24	06-Sep-24
New Battery Powered Handicapped Lift	10	12-Aug-24	23-Aug-24
New Record Board and Team Signage	10	12-Aug-24	23-Aug-24
New Bulkheads Wheels and Compress	15	19-Aug-24	06-Sep-24



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

SKILLMAN

Activity Name	Original Duration	Start	Finish
Pool New Timing Positions	20	09-Sep-24	04-Oct-24
Remove Carpet @ Seating	10	09-Sep-24	20-Sep-24
Mobile Bleachers	10	23-Sep-24	04-Oct-24
Polish Concrete an Seating Risers	20	23-Sep-24	18-Oct-24
Pool Starting Blocks	15	07-Oct-24	25-Oct-24
New Acoustical Treatments	30	21-Oct-24	29-Nov-24
Add Benches to Concrete Spectator Se	20	28-Oct-24	22-Nov-24
Repair & Replace Doors & Hardware in	10	18-Nov-24	29-Nov-24
Pool Renovation Substantial Completio	0		29-Nov-24*
Existing Natatorium MEP	120	03-Jun-24	15-Nov-24
New Sound System	20	03-Jun-24	28-Jun-24
Replace Dehumidification Units	50	03-Jun-24	09-Aug-24
LED Lighting	20	01-Jul-24	26-Jul-24
Change Underdrain and Media	15	15-Jul-24	02-Aug-24
Replace Strainer	10	05-Aug-24	16-Aug-24
Replace AHU	50	12-Aug-24	18-Oct-24
Change Ph Control System to CO2 anc	10	19-Aug-24	30-Aug-24
Replace Existing Filter System with SS	15	02-Sep-24	20-Sep-24
Pool Heating-Heat Exchanger	20	23-Sep-24	18-Oct-24
New UV Wired Into Existing Prominent	20	21-Oct-24	15-Nov-24
Repair Floor Drains in Locker Room (sl	20	21-Oct-24	15-Nov-24



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

SKILLMAN

A D D E N D U M N O. 1

Carmel High School Natatorium Additions and Renovations

Project No. 220014.00

Carmel Clay Schools
Carmel, Indiana

Index of Contents

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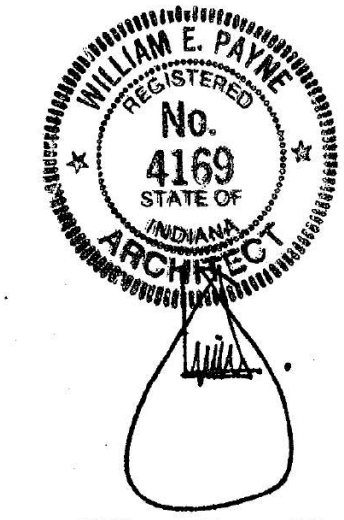
New Drawing Sheet S3.16
Revised Drawing Sheets: G1.1, G1.2, G1.3, G1.4, G1.5, G2.2, G4.1, G4.2, S1.02, S1.03, S1.04, S3.06, S3.10, S3.13, AD.06, A1.01, A1.10, A1.11, A1.12, A1.16, A7.09, A7.10, A7.13, A7.14, A8.01, A8.02, A8.04, A8.05, A8.07, A8.15, A8.16, A8.17, A8.22, A8S.01, A10.04, PL0.0, PL9.0, PL11.0, PLE2.0, PLE3.0, MD.02, MD.03, MD.04, MD.05, MD.06, M2.02, M2.06, M2.07, M2.09, M2.10, M2.11, M2.12, M2.14, M3.02, M3.09, M3.10, M4.01, M4.02, M4.03, M5.01, M5.04, M5.05, ED.02, E4.03, E4.06, E4.07, E4.08, E5.01, E5.02, E5.07, E5.10, E8.01, T000, T1.03, T1.04, T1.05, and T5.01

Date: January 25, 2022

FANNING/HOWEY ASSOCIATES, INC.
ARCHITECTS/ENGINEERS/CONSULTANTS



William E. Payne, AIA
Indiana Registration No. 4169

TO: ALL BIDDERS OF RECORD

ADDENDUM NO. 1 to Drawings and Project Manual, dated January 10, 2022 for Carmel High School Natatorium Addition and Renovations for Carmel Clay Schools, 5201 East Main Street, Carmel, Indiana 46033; as prepared by Fanning/Howey Associates, Inc., Indianapolis, Indiana.
This Addendum shall hereby be and become a part of the Contract Documents the same as if originally bound thereto.

The following clarifications, amendments, additions, revisions, changes, and modifications change the original Contract Documents only in the amount and to the extent hereinafter specified in this Addendum.

Each bidder shall acknowledge receipt of this Addendum in his proposal or bid.

NOTE: Bidders are responsible for becoming familiar with every item of this Addendum. (This includes miscellaneous items at the very end of this Addendum.)

RE: ALL BIDDERS

ITEM NO. 1. REVISED PROJECT MANUALS

Project Manual Books 2, 3, and 4 have been revised and updated on the Plan Distribution Website. Plan Holders can download updated documents from the Skillmanplanroom.com.

Revised or New Specification Sections include the following:

Book 2: 03 41 00, 04 20 00, 05 52 13, 07 54 00, 07 81 00, 08 56 00, 08 71 00, 08 87 23, 09 51 13, 09 54 23, 09 65 19, 09 96 00, 10 28 00, 11 31 00, 12 32 16, 12 63 13, 12 93 00, 13 15 00 and 13 15 60.

Book 3: 23 31 16, 23 73 13, 23 73 15, 23 74 13, and 23 82 33.

Book 4: 27 41 00, 32 17 13, and 32 31 13

ITEM NO. 2. REVISED PROJECT MANUAL SECTIONS

A. Section 06 61 16 – Solid Surface Fabrications has been revised, dated 1/25/22, and are included with and hereby made a part of this Addendum.

ITEM NO. 3. PROJECT MANUAL, SECTION 05 31 00 – STEEL DECKING

A. Add 2.3, A., 1., c., as follows:

"c. Location: All locations except Pool Environment."

B. Replace 2.3, A., 2., as follows:

"2. Steel Roof Deck with factory applied high-performance coating."

Note: Remaining subparagraphs of 2.3, A., 2., remain unchanged.

C. Add 2.3, B., as follows:

"B. Steel Roof Deck: Fabricated panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck", in SDI Publication No. 31, and with following:

1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33 G60 zinc coating, unless otherwise noted.
   a. Do not pre-treat surface with chromates or other passivating treatments where deck is to be painted.
2. High Performance Coating: Factory applied.
   a. Surface Preparation: Galvanized deck shall be cleaned, treated, and prepped as required by the primer manufacturer to remove all film, coatings and other contaminates.
   b. Shop Applied prime Coating: Polyamide Epxoy, Tnemec Series 161 applied to a dry film thickness of 2.0 to 3.0 mils.
   c. Location: Cellular Deck exposed at entrance canopy.
3. Cellular Deck Profile: Type WR, wide rib with flat solid bottom plate.
   a. Profile Depth: As indicated on Drawings
4. Design Uncoated-Steel Thickness: As indicated on Drawings."

D. Add 2.5, A., 1., b., as follows:

"b. Location: All locations except Pool Environment."

E. Replace 2.5, A., 2., as follows:

"2. Composite Steel Floor Deck with factory applied high-performance coating. ASTM A 653, Structural Steel (SS), Grade 33, G90 zinc coating."

Note: Remaining subparagraphs of 2.5, A., 2, remain unchanged

ITEM NO. 4. PROJECT MANUAL, SECTION 05 51 00 – METAL STAIRS

A. Add 2.9, B., 6., as follows:

"6. Intermediate stringer support required due to width of stair must be concealed below tread and riser configuration. Stringer assembly extension above stair tread level is not permitted."

ITEM NO. 5. PROJECT MANUAL, SECTION 08 91 19 – FIXED LOUVERS

A. Add 1.2, A., 2., as follows:

"2. Interior and exterior fixed louvers."

B. Add 2.3, D., 2., a., as follows:

"a. Utilize stainless steel fasteners for fixed louvers in the natatorium/pool environment."

ITEM NO. 6. PROJECT MANUAL, SECTION 09 96 00 – HIGH PERFORMANCE COATINGS

A. Add 3.7, D., 6., as follows:

"6. High-Build Coating System: (Code #5.228)
   a. Preparation: SSPC-SP3 – Power Tool Cleaning. Remove all loose rust.
   b. Prime Coat: Two-component, penetrating epoxy primer sealer, 1-2 mils DFT.
      1) PPG; Amerlock Sealer
   c. Intermediate Coat: Same as topcoat.
   d. Topcoat: Two-component, high solids epoxy coating
      1) PPG; Amerlock 400
   e. Application includes but is not limited to:
      1) Existing rusted steel floor deck and steel wall angles.

f. Acceptable additional Manufacturer's:
   1) Carboline
   2) Sherwin Williams Protective and Marine Coatings
   3) Tnemec"

ITEM NO. 7. PROJECT MANUAL, SECTION 10 51 26 – SOLID PLASTIC LOCKERS

A. Delete 1.2, A., 2., in its entirety.

B. Delete Article 2.8 in its entirety.

C. Delete 3.2, H., in its entirety.

ITEM NO. 8. PROJECT MANUAL, SECTION 14 24 00 – HYDRAULIC ELEVATORS

A. Add Article 1.12 as follows:

"1.12 WARRANTY

A. Manufacturer's standard material and workmanship warranty for Elevator components and operation for a period of 12 months after project substantial completion."

B. Article 2.8, B., 7.: Change "powder coated steel" to "brushed stainless steel" within sentence.

C. Replace 2.9, B., 3, as follows:

"3. Provide column type car control station, one at each door, two total."

D. Add 2.9, D., 4., as follows:

"4. Provide hall station at each landing at each door location, front and rear."

ITEM NO. 9. PROJECT MANUAL, SECTION 23 74 13 – PACKAGED OUTDOOR CENTRAL STATION AIR HANDLING UNITS

A. Add 2.12, D., as follows:

"D. Compressor Sound Attenuating Blanket: Compressor sound blankets shall be capable of a minimum 4 dBA overall sound reduction. Sound attenuating blankets shall be a minimum of 2 inches thick and made of an outer and inner jacketing with integral fasteners for install and removal. Outer/inner jacketing shall be a vinyl coated polyester cloth and the inner core insulation shall be a fiberglass absorber."

ITEM NO. 10. PROJECT MANUAL, SECTION 23 37 13 – DIFFUSERS, REGISTERS, AND GRILLES

A. Revise Article 2.9 to read:

2.9 ALUMINUM SUPPLY REGISTER (TYPE S)

A. All aluminum construction, minimum 0.032 inch thick border.

B. Double deflection blades, 3/4 inch blade spacing.

C. Front and rear blades, individually adjustable. Blades shall have friction pivots on both ends; plastic blade pivots are not acceptable.

D. Front blades parallel to the long dimension.

E. Surface mounted on exposed ductwork.

F. Baked white enamel finish (unless otherwise noted).

G. Size of grille as indicated on Drawings.

H. Equivalent to Titus "300FL."

ITEM NO. 11. ACCEPTABLE MANUFACTURERS

The following manufacturers are to be considered acceptable manufacturers (suppliers and fabricators) for the Sections of the Specifications listed. Listed manufacturers are required to bid on products equal in type and design, size, function, and quality to that originally specified. Final decision as to equality of products specified versus those proposed shall be made by the Architect.

Section 08 91 19 – Fixed Louvers
- Pottorff, Fort Worth, Texas

Section 12 32 16 – Manufactured Plastic Laminate-Faced (Educational) Casework
- Euronique, Inc., Eberfeld, Indiana

Section 13 15 00 – Competition Swimming Pool, Therapy Pool, Diving Pool, Warm Water Pool and Equipment
- Neptune Benson, Warwick, Rhode Island (Article 2.30, Strainer only)

Section 23 21 23 – Hydronic Pumps
-Aurora (Div. Of Pentair)

Section 23 31 16 – Nonmetal Ducts
-Durkee
-Prihoda

Section 23 33 00 – Air Duct Accessories
-NCA (Manual Volume Dampers)
-Pottorff (Smoke Dampers)

Section 23 36 00 – Air Terminal Units
-Krueger
-Metalaire

Section 23 37 23 – HVAC Gravity Ventilators
-Acme (Article 2.3)

Section 23 51 00 – Breechings, Chimneys and Stacks
-Duravent

Section 23 73 13 – Modular Indoor Central Station Air-Handling Units
-Pace (Article 2.2)

Section 23 74 13,– Packaged, Outdoor, Central-Station Air-Handling Units
-Tempmaster

Section 23 82 39 – Unit Heaters
- VTS (Article 2.2)

ITEM NO. 12. NEW DRAWING SHEET(S)

A. Drawing Sheet No. S3.16 – Sections and Details, is included with and hereby made a part of this Addendum.

ITEM NO. 13. REVISED DRAWING SHEETS

A. Drawing Sheets: G1.1, G1.2, G1.3, G1.4, G1.5, G2.2, G4.1, G4.2, S1.02, S1.03, S1.04, S3.06, S3.10, S3.13, AD.06, A1.01, A1.10, A1.11, A1.12, A1.16, A7.09, A7.10, A7.13, A7.14, A8.01, A8.02, A8.04, A8.05, A8.07, A8.15, A8.16, A8.17, A8.22, A8S.01, A10.04, PL0.0, PL9.0, PL11.0, PLE2.0, PLE3.0, MD.02, MD.03, MD.04, MD.05, MD.06, M2.02, M2.06, M2.07, M2.09, M2.10, M2.11, M2.12, M2.14, M3.02, M3.09, M3.10, M4.01, M4.02, M4.03, M5.01, M5.04, M5.05, ED.02, E4.03, E4.06, E4.07, E4.08, E5.01, E5.02, E5.07, E5.10, E8.01, T000, T1.03, T1.04, T1.05, and T5.01 have been revised, dated 1/25/22 and are included with and hereby made a part of this Addendum. These Drawings supersede the original documents.

ITEM NO. 14. DRAWING SHEET ABBREVIATIONS AND INDEX (VOLUME A)

A. Add sheet “S3.16 SECTIONS AND DETAILS” to the sheet index.

ITEM NO. 15. DRAWING SHEET ABBREVIATIONS AND INDEX (VOLUME B)

A. Add sheet “S3.16 SECTIONS AND DETAILS” to the sheet index.

ITEM NO. 16. DRAWING SHEET NO. S1.01

A. Delete grid label C53 and change grid label C54 to 24.

ITEM NO. 17. DRAWING SHEET NO. S1.05

A. Delete grid label C53 and change grid label C54 to 24.

ITEM NO. 18. DRAWING SHEET NO. S1.07

A. Delete grid label C53 and change grid label C54 to 24.

ITEM NO. 19. DRAWING SHEET NO. S1.08

A. Delete grid label C53 and change grid label C54 to 24.

B. Room N110: Provide floor opening with curb for return air duct. Coordinate location with FO on sheet S2.02

ITEM NO. 20. DRAWING SHEET NO. S2.01

A. Delete grid label C53 and change grid label C54 to 24.

B. Revise plan note for deck span labeled 3R as follows: “3” ACOUSTICAL CELLULAR ROOF DECK SPAN (~~DR18~~18/18, U.O.N).

ITEM NO. 21. DRAWING SHEET NO. S2.02

A. Delete grid label C53 and change grid label C54 to 24.

B. Revise plan note for deck span labeled 3R as follows: "3" ACOUSTICAL CELLULAR ROOF DECK SPAN (~~DR18~~18/18, U.O.N).

ITEM NO. 22. DRAWING SHEET NO. S2.03

A. Revise plan note for deck span labeled 3R as follows: "3" ACOUSTICAL CELLULAR ROOF DECK SPAN (~~DR18~~18/18, U.O.N).

ITEM NO. 23. DRAWING SHEET NO. S2.04

A. Delete grid label C53 and change grid label C54 to 24.

B. Revise plan note for deck span labeled 3R as follows: "3" ACOUSTICAL CELLULAR ROOF DECK SPAN (~~DR18~~18/18, U.O.N).

ITEM NO. 24. DRAWING SHEET NO. S2.05

A. Delete grid label C53 and Change grid label C54 to 24.

B. Revise plan note for deck span labeled 3R as follows: "3" ACOUSTICAL CELLULAR ROOF DECK SPAN (~~DR18~~18/18, U.O.N).

ITEM NO. 25. DRAWING SHEET NO. S2.06

A. Revise plan note for deck span labeled 3R as follows: "3" ACOUSTICAL CELLULAR ROOF DECK SPAN (~~DR18~~18/18, U.O.N).

ITEM NO. 26. DRAWING SHEET NO. S3.03

A. Detail 2: Add following note "COORDINATE SIZE OF STOOP WITH JOINT PATTERNS SHOWN ON SITE DRAWINGS".

ITEM NO. 27. DRAWING SHEET NO. S3.05

A. POOL SECTION NOTES: Add "COORDINATE OVERALL CONCRETE DIMENSIONS WITH THE TILE FINISH AND SETTING BED TO ENSURE CORRECT FININSHED FACE OF TILE DIMENSIONS" to Note 1.

ITEM NO. 28. DRAWING SHEET NO. S3.11

A. SECTION 9: Replace note "1" GALV. STEEL BAR GRATING (TYP)" with "BAR GRATING (TYP), BY DIV 13 CONTRACTOR".

B. SECTION 9: Replace note "GALV. L1 1/4x1 1/4x1/4 W/ ½" DIA. x 6" HEADED STUDS AND 16" o.c. STAGGER AS REQ'D" WITH "PROVIDE RECESS IN CONCRETE WALL FOR BAR GRATING. COORDINATE SIZE WITH DIV. 13 CONTRACTOR."

C. SECTION 10: Replace note "1" GALV. STEEL BAR GRATING (TYP)" with "BAR GRATING (TYP), BY DIV 13 CONTRACTOR".

D. SECTION 10: Replace note "GALV. L1 1/4x1 1/4x1/4 W/ ½" DIA. x 6" HEADED STUDS AND 16" o.c. STAGGER AS REQ'D" WITH "PROVIDE RECESS IN CONCRETE WALL FOR BAR GRATING. COORDINATE SIZE WITH DIV. 13 CONTRACTOR."

E. SECTION 11: Replace note "1" GALV. STEEL BAR GRATING (TYP)" with "BAR GRATING (TYP), BY DIV 13 CONTRACTOR".

F. SECTION 11: Replace note "GALV. L1 1/4x1 1/4x1/4 W/ ½" DIA. x 6" HEADED STUDS AND 16" o.c. STAGGER AS REQ'D" WITH "PROVIDE RECESS IN CONCRETE WALL FOR BAR GRATING. COORDINATE SIZE WITH DIV. 13 CONTRACTOR."

ITEM NO. 29. DRAWING SHEET NO. S4.06

A. Detail 1 Masonry Wall Panel Elevation: Change grid label C54 to 24.

B. Detail 3 Masonry Wall Panel Elevation: Change grid label C54 to 24.

ITEM NO. 30. DRAWING SHEET NO. S5.03

A. Detail 1 Truss T1 Elevation: Delete grid label C53. Change grid label C54 to 24.

B. Detail C Truss T1 Detail: Delete grid label C53. Change grid label C54 to 24.

ITEM NO. 31. DRAWING SHEET NO. A1.00

A. Add new wall type "W27" as follows:

"W27 plastic laminate panel system on 5/8" gypsum wallboard on 7/8" metal furring (hat) channels at 1'-4" O.C. Provide recessed base, as scheduled."

ITEM NO. 32. DRAWING SHEET NO. A5.07

A. On Section No. 3, add dimension of 1'-2" between column lines 54 and N2.

B. On Section No. 4, add dimension of 1'-2" between column lines 54 and N2.

C. On Section No. 3, Change Working Point elevation from 11'-7 ¼" to 112'-3 3/8" and shift up so it designates the bottom of deck along column line N2.

ITEM NO. 33. DRAWING SHEET NO. A10.01

A. On enlarged plan 2-A10.01, delete display case dimensions entirely. Refer to A7.13 for display case information.

END OF ADDENDUM

SECTION 03 41 00 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Precast structural concrete panels with commercial architectural finish.

B. Related Sections:
   1. Division 03 Section "Cast-in-Place Concrete" for concrete topping and placing connection anchors in concrete.
   2. Division 04 Section "Unit Masonry" for inserts or anchorages required for precast concrete slab connections.
   3. Division 05 Section "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
   4. Division 05 Section "Metal Fabrications" for kickers and other miscellaneous steel shapes.
   5. Division 07 Section "Penetration Firestopping" for joint-filler materials for fire-resistance-rated construction.
   6. Division 07 Section "Joint Sealants" for elastomeric joint sealants and sealant backings.

1.3 DEFINITION

A. Pool Environment: The pool environment for special coatings, materials, and treatments includes the competition pool space, pool deck, pool equipment room, pool storage rooms, spectator seating areas and adjacent spaces within the same enclosure. Room numbers as follows: N013, N021, N021A, N022, N027, N029, N030, N035, N036, N036A, N036B, N037, N039, N102, N104, N107, N109, N201, N202, N203, N204, G023, G024, G102, and G103.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions as required for installation.

B. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

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

B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

C. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
   1. Include member locations, plans, elevations, dimension, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
   2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.
   3. Indicate joints, reveals, and extent and location of each surface finish.
   4. Indicate separate face and backup mixture locations and thicknesses.

5. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
6. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
8. Include and locate openings larger than 10 inches by 10 inches. Where additional structural support is required, include header design.
9. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
10. Indicate relationship of precast structural concrete units to adjacent materials.
11. Indicate shim sizes and grouting sequence.
12. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and shop drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials. Maintain general design concept.

D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Show precast structural concrete unit types, connections, type of reinforcement, including special reinforcement, and concrete cover of reinforcement. Indicate location type, magnitude, and direction of loads imposed on the building structural frame from precast structural concrete.

1.6 INFORMATIONAL/QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Welding certificates.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
1. Participates in PCI's Plant Certification program at time of bidding and is designated a PCI-certified plant as follows:
a. Group C, Category C3 - Prestressed Straight Strand Structural Members
b. Group CA, Category C3A - Prestressed Straight-Strand Structural Members.

B. Installer Qualifications: A precast concrete erector qualified at time of bidding, as evidenced by PCI's Certificate of Compliance, to erect Category S1 - Simple Structural Systems and Category S2 - Complex Structural Systems.

C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

D. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for architectural precast concrete units.
1. Professional engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of precast concrete units that are similar to that indicated for this Project in material, design, and extent.

E. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.

B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
   1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
   2. Place adequate dunnage of even thickness between each unit.
   3. Place stored units so identification marks are clearly visible, and units can be inspected.

C. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.

D. Lift and support units only at designated points shown on shop drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design Standards: Comply with ACI 318 and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

C. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated on drawings.
   1. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318.

2.2 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
   1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

B. Surface Retarder: Chemically set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.3 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed, unless otherwise noted.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed, where indicated.

C. Steel Bar Mats: ASTM A 184, fabricated from ASTM A 615, Grade 60, deformed bars, assembled with clips.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.4 PRESTRESSING TENDONS

A. Pretensioning Strand: ASTM A 416, Grade 250 or Grade 270, uncoated, 7-wire, low-relaxation strand.

2.5 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
2. Standard grey Portland cement may be used for non-exposed concrete.

B. Supplementary Cementitious Materials:
1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
2. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 4S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of materials that react with cement or cause staining; to match selected finish sample.
a. Gradation: Uniformly graded.
2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate unless otherwise approved by A/E.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
1. Water-Reducing Admixtures: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
7. Plasticizing and Retarding Admixture: ASTM C 1017.

G. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.6 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36.

B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.

C. Carbon-Steel Plate: ASTM A 283, Grade C..

D. High-Strength, Low-Alloy Structural Steel: ASTM A 572.

E. Carbon-Steel Structural Tubing: ASTM A 500, Grade B or Grade C.

F. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706.

G. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.

H. High-Strength Bolts, Nuts, and Washers: ASTM F 3125, Grade A 325 Type 1, heavy hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
   1. Finish Hot-dip zinc coating.

I. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153.
   1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
   2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
   3. All steel connection material exposed to the pool environment and support space environment must have a galvanized finish.

J. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply SSPC-Paint 25 according to SSPC-PA 1.

K. Welding Electrodes: Comply with AWS standards.

L. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.7 BEARING PADS

A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:
   1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi, ASTM D 412.
   2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D 2240; capable of supporting a compressive stress of 3000 psi with no cracking, splitting, or delaminating in the internal portions of pad. Test 1 specimen for every 200 pads used in Project.
   3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; 80 to 100 Shore, Type A durometer hardness, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Specifications," Division II, Section 18.10.2; or with MIL-C-882E.
   4. Frictionless Pads: Tetrafluoroethylene, glass-fiber reinforced, bonded to stainless- or mild-steel plate, of type required for in-service stress.
   5. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

2.8 ACCESSORIES

A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install structural precast concrete units.

2.9 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
   1. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881, of type, grade, and class to suit requirements.

2.10 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.
   1. Limit use of fly ash to 25 percent replacement of Portland cement by weight and granulated blast-furnace slab to 40 percent of Portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: At fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, proportion face and backup mixtures or full-depth mixtures, with materials to be used on Project, to provide normal-weight concrete with the following properties:
   1. Compressive Strength (28 Days): 5000 psi.
   2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: For structural precast concrete with architectural finish, limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.11 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
   1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.

B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated within fabrication tolerances specified.
   1. Form joints are not permitted on faces exposed to view in the finished work.
   2. Edge and Corner Treatment: Uniformly chamfered, unless otherwise noted.

2.12 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
   1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1 and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without A/E's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
   1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
   2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
   3. Place reinforcement to maintain at least 3/4-inch minimum coverage. Increase cover requirements according to ACI 318 when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
   4. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
   5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.

G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
   1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete.
   2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
   3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.

4. Protect strand ends and anchorages with a minimum of 1-inch- thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.

H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

I. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

J. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
1. Place backup concrete mixture to ensure bond with face-mixture concrete.

K. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

L. Comply with ACI 306.1 procedures for cold-weather concrete placement.

M. Comply with PCI MNL 116 procedures for hot-weather concrete placement.

N. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on shop drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.

O. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

P. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and A/E's approval.

Q. Long-Span Units
1. Type: Plant-fabricated, precast, prestressed concrete long-span units.
2. Furnish units free of voids and honeycombs.
3. Provide standard finish to precast concrete units, unless otherwise indicated.
a. If used as roof members, provide smooth, float top finish to precast concrete units.
4. Reinforce units to resist transportation and erection stresses.
5. Include cast-in weld plates where required.
6. Coordinate with other trades for installation of cast-in items.

R. Structural Framing Units
1. Type: Precast, prestressed structural concrete framing units.
2. Furnish units free of voids and honeycombs.
3. Provide standard finish to precast concrete units.
4. Reinforce units to resist transportation and erection stresses.
5. Include cast-in weld plates where required.
6. Coordinate with other trades for installation for cast-in items.

2.13 FABRICATION TOLERANCES

A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

2.14 COMMERCIAL FINISHES

A. Commercial Grade: Remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch.

B. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
   1. Exposed surfaces panels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.

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

C. Do not install precast concrete units until supporting, cast-in-place, building structural framing has attained minimum allowable design compressive strength or until supporting steel or other structure is complete.

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
   1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
   2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
   3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on shop drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
   1. Do not permit connections to disrupt continuity of roof flashing.

D. Field cutting of precast units is not permitted without approval of the A/E.

E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

F. Welding: Comply with applicable AWS D1.1 and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
   1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
   2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
   3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
   4. Remove, reweld, or repair incomplete and defective welds.

G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
   1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
   2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:
      a. Turn-of-Nut: According to RSCS's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
      b. Calibrated Wrench: According to RSCS's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
      c. Twist-off Tension Control Bolt: ASTM F 1852.
      d. Direct-Tension Control Bolt: ASTM F 1852.
   3. For slip-critical connections, use method and inspection procedure approved by A/E and coordinated with inspection agency.

H. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on shop drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.
   1. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
   2. Fill joints completely without seepage to other surfaces.
   3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
   4. Place grout end cap or dam in voids at ends of hollow-core slabs.
   5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
   6. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by A/E.

3.4 REPAIRS

A. Repair precast structural concrete units if permitted by A/E.
   1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work when viewed in typical daylight illumination from a distance of 20 feet.

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by A/E.

3.5 CLEANING

A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
   1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
   2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03 41 00

SECTION 04 20 00.00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:
1. Concrete masonry units (CMUs).
2. Clay face brick.
3. Glazed brick.
4. Mortar and grout.
5. Reinforcing steel bars.
6. Masonry joint reinforcement.
7. Ties and anchors.
8. Embedded flashing.
9. Miscellaneous masonry accessories.
10. Cavity-wall insulation.

B. Related Sections include the following:
1. Division 03 Section “Cast-in-Place Concrete” for dovetail slots for masonry anchors.
2. Division 04 Section “Cast Stone Masonry” for furnishing cast stone trim.
3. Division 04 Section "Glass Unit Masonry" for glass block.
4. Division 07 Section "Bituminous Dampproofing" for dampproofing applied to cavity face of backup wythes of cavity walls.
5. Division 07 Section “Fluid-Applied Air and Vapor Barrier” for fluid-applied membrane air barrier, vapor permeable.
6. Division 07 Section “Sheet Metal Flashing and Trim” for formed reglets and for additional requirements for solder and sealant for sheet metal flashing.
7. Division 07 Section "Penetration Firestopping" for firestopping at openings and penetrations in masonry walls.
8. Division 07 Section “Joint Firestopping” for joints in masonry.
9. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.
10. Division 08 Section “Hollow Metal Doors and Frames” for installation requirements.
11. Division 09 Sections “Tiling” and “Resilient Base and Accessories” for coordination of bullnosed CMU with height of wall base.

C. Products installed, but not furnished, under this Section include the following:
1. Cast-stone trim, furnished under Division 04 Section "Cast Stone Masonry."
2. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section “Structural Steel Framing”.
3. Products furnished under Division 05 Section “Metal Fabrications”, including post installed anchors.
4. Nailing blocks furnished under Division 06 Section “Rough Carpentry”.
5. Hollow metal frames will be provided under Division 08 Section “Hollow Metal Doors and Frames”.
6. Conduits and plumbing will be provided under Division 21 – Fire Suppression, Division 22 – Plumbing, Division 23 – Heating, Ventilating, and Air Conditioning, Division 26 – Electrical, Division 27 – Communications, and Division 28 – Electronic Safety and Security.

D. Pool Environment: The pool environment for special coatings, materials, and treatments includes the competition pool space, pool deck, pool equipment room, pool storage rooms, spectator seating areas and adjacent spaces within the same enclosure. Room numbers as follows: N013, N021, N021A, N022, N027, N029, N030, N035, N036, N036A, N036B, N037, N039, N102, N104, N107, N109, N201, N202, N203, N204, G023, G024, G102, and G103.

1.3 REFERENCES

A. Definitions
1. General: Definitions, glossary and terminology used in this Section are from the National Concrete Masonry Association TEK 01-04.
2. CMU(s): Concrete Masonry Units.
3. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.
4. Cavity: A continuous air space between wythes of masonry or between masonry and its backup system.
5. Cavity Mortar Protection: Used in conjunction with flashing and weep vents to provide a system to properly evacuate moisture from a masonry cavity wall by providing a continuous path for incidental moisture to escape from weep vents.
6. Cavity Wall: A multiwythe non-composite masonry wall with a continuous air space within the wall (with or without insulation), which is tied together with metal ties.
7. Composite Wall: A multiwythe wall where the individual masonry wythes act together to resist applied loads. Transfer of stress between components of a member designed so that in resisting loads, the combined components act together as a single member.
8. Wall, Loadbearing: Wall that supports vertical load in addition to its own weight. By code, a wall carrying vertical loads greater than 200 lb./ft. in addition to its own weights.
9. Wall, Multiwythe: Wall composed of 2 or more masonry wythes.
10. Wythe: Each continuous vertical section of a wall, one masonry unit in thickness.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of masonry and masonry accessories with thermal and air barrier and other moisture protection work to provide a tested wall assembly.

B. Pre-installation Meeting: Conduct meeting at Project site. Note: As work progresses, additional pre-installation meetings might need to take place to coordinate installation of various components of exterior enclosure.
1. Meet with Owner, A/E, CM, testing and inspection agency representative, mason, and other installers whose work interfaces with or affect masonry.
2. Review methods and procedures related to masonry installation, including manufacturers' requirements and recommendations.
3. Review temporary protection requirements.
4. Review mockup and cleaning requirements.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including but not limited to:
1. Cavity wall insulation.
2. Flexible flashing materials, including manufacturer’s written installation instructions.
a. Refer to Division 07 “Air Barrier” sections for flashing requirements. Flashing must be as approved by air barrier system manufacturer for system chosen.
3. Typical installation methods with requirements to accommodate specific site conditions.

B. Shop Drawings: For the following:
1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes, including full return corner units.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI PRC-315, "Guide to Presenting Steel Design Details." Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end dam units, and other special applications.

C. Samples for Verification: For each type and color of the following:
   1. Provide samples at the project site only.
   2. Face brick, in the form of straps of five or more bricks.
   3. Glazed brick, three units

1.6 INFORMATIONAL/QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
   1. Masonry units.
      a. Provide material test reports substantiating compliance with requirements, if requested.
      b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include material test report for efflorescence according to ASTM C 67, and the following:
         1) Compressive strength
         2) 24 hour cold water absorption
         3) 5 hour boil absorption
         4) Saturation coefficient
         5) Initial rate of absorption (suction)
      d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing according to ASTM C 67 and a list of address of buildings in Project's area where proposed bricks has been used successfully and with a history of durability.
   2. CMU: Upon regular presentation within past 12 months of representative units by approved manufacturer, a test report from an independent laboratory showing resultant weight, compressive strength (based on net area), and water absorption properties, as well as adherence to standards where so specified, for:
      a. Each proposed type and size of concrete masonry units.
      b. Test reports shall conform to ASTM C140 and shall include:
         1) Name of Manufacturer
         2) Date of Manufacture of Test Specimen
         3) Dimension Measurements (in.)
         4) Calculated Gross Area (sq.in.)
         5) Calculated Net Area (sq.in.)
         6) Total Load (lbs.)
         7) Net Unit Load (psi)
         8) Sample Weight (lbs.)
         9) Dry Weight (lbs.)
         10) Wet Weight (lbs.)
         11) Immersed Weight (lbs.)
         12) Density (pcf)
         13) Moisture Content (%)
         14) Absorption (%)
         15) Linear Shrinkage Coefficient (%)
   a. CMU: Submit compression test results from an independent testing laboratory showing the compressive strength of each type and size of concrete masonry units delivered to the construction site during the first fifteen days of masonry construction. Submit additional tests from each type and size of concrete masonry units for each 10,000 sq.ft. of concrete masonry wall constructed. The independent testing laboratory is to select units to be tested from materials stockpiled on the Project site.
   4. Cementitious materials. Include brand, type, and name of manufacturer.
   5. Mortar admixtures.
   6. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   7. Grout mixes. Include description of type and proportions of ingredients.
   8. Reinforcing bars.
   9. Joint reinforcement.

10. Anchors, ties, and metal accessories.
11. Flexible Flashing. Certification of compatibility by manufacturer, listing all materials on the Project with which the product and accessories may come into contact.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement. For both fine and course grouts including complete identities and proportions of ingredients.
   a. Weight of each ingredient including water.
   b. Measured slump.
   c. Water/cement ratio.
   d. Sieve analysis for aggregates.

C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in TMS 402/602.

D. Certification: "Grouting and Reinforcing Certification" by the International Masonry Institute as a "Certified Grout Installer" or having successfully completed the IMI training and certification for "Grouting and Reinforcing Certification" or a similar program approved by A/E.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated.
1. Cooperate and coordinate with Owner's Inspection and testing agency. Do not cover any installed flexible flashing membrane, unless it has been inspected, tested, observed and digitally documented by testing lab.

B. Installer
1. Grouting and Reinforcing: All masonry grouting and reinforcing work shall be performed by masonry craft workers who have successfully completed the International Masonry Institute (1-800-IMI-0988) training course for Grouted and Reinforced Masonry Construction to similar program approved by A/E. Contractor may also perform work under the supervision of a "Certified Grout Installer" as long as supervisor is present at the time of each pour.
2. Flashing Assemblies: All masonry flashing assemblies shall be installed by masonry craft workers who have completed the International Masonry institute (1-800-IMI-0988) upgrade training course for "Masonry Flashing" or a similar program by flashing manufacturer approved by A/E.
   a. Instructor/Flashing Manufacturer's Representative conducting training for flashing installation shall:
      1) Assist/review flashing at "mockup".
      2) Pay at least one other visit to the Project site at the A/E's direction.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Do not proceed with work prior to receipt of written acceptance of mock-up by A/E. Observation and evaluation of the mockup shall be by A/E CM General Trades Contractor and Masonry Contractor,.
1. Build mockup of typical wall area(s) as shown on Drawings.
   a. General, exterior wall mockup shall be constructed to verify wall performance. Mockup shall demonstrate how components will integrate into the assembly and exhibit how the thermal and air barrier transition to various components, for example, wall transition to roof. Coordinate mockup with testing requirements of Air Barrier.

b. Use step-back construction to expose the relationship of various wall components to each other. Components incorporated and exposed for observation shall include examples of:
    1) Facing units;
    2) Weeps, vents, cavity drainage material, and other accessories; including clean out ports;
    3) Mortar of the correct color(s) and strength(s);
    4) Backup wall construction;
        a) Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup; with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
    5) Joint reinforcing;
    6) Structural reinforcing, grouting, and accessories;
    7) Ties and anchors;
    8) Cavity insulation, air barriers and/or vapor retarders;
    9) Shelf angles and their supports;
    10) Bond beams and lintels;
    11) Flashings (including terminations, plane changes, and end dams); and
        a) Include air barrier veneer anchors, flashing, cavity mortar protection, and weep vents in exterior masonry-veneer wall mockup, where applicable.
    12) Masonry expansion and control joints
    13) Include at least one switch or outlet box. If surface mounted items, such as exterior lighting, audio horns, or video cameras, will be installed in split-faced masonry, provide at least one example installation.
c. Include a sealant-filled joint at least 16 inches long in each exterior wall mockup.
d. Mockups shall include typical parapet/eave detail, transitions from wall to roof/roof to wall (flashing, thermal and air barrier transition details), and include the following typical wall penetrations:
    1) Entries/doors.
    2) Openings, i.e. storefront, curtainwall, and windows.
        a) First in place of each type opening installed shall leave portions of the perimeter exposed for inspection of fasteners and air barrier transitions. Some portions of mockup shall receive final sealant so it can be tested for air barrier compliance.
        b) Demonstrate blocking at openings, movement joints (sealant filled) minimum 1 to 4 inches.
        c) Demonstrate installation of lower corner of window opening at upper corner of exterior wall.
    3) Roof to wall transitions, including pitched roof to high wall transitions when applicable.
    4) Include an example of thru-wall penetration by each trade contractor including fire protection, plumbing, mechanical and electrical.
e. The mockup shall be photographed or recorded on video by the masonry contractor to be part of a presentation for groups of trade's people as they join project work force.

2. The mockup need not be fully constructed at one time, but construction and approval of each element shall precede the construction of its respective exterior wall components. The mockup shall mirror the building development starting with the foundation and ending at the top of the wall and its transition to the roof. Reviews will be scheduled around the weekly progress meetings. If required attendees are not present, then that phase will be delayed and rescheduled. Respective mockup phase shall be completed and approved before that portion of work starts at the building. Anticipated phasing:
    a. Phase One: Install the CMU backup wythe per the approved mockup drawing. The CMU backup wythe shall include rebar, centering clips, ladder reinforcing, grout, bond beam, and bearing plates.

b. Phase Two: Install the embedded flashing in the presence of A/E, CM, General Trades Contractor and Masonry Contractor flashing manufacturer, and Owner's Testing and Inspection Agency. Embedded flashing shall include the flashing, all sealants and adhesives, termination bar, fasteners, end dams, and inside and outside corners.
   1) Pre-Installation Meeting for masonry veneer will be held on this date.
   2) Flashing will be reviewed and will require approval by all present.

c. Phase Three: Review the exterior face of the CMU backup wythe prior to the installation of the air barrier / spray insulation. Install the air barrier / spray insulation in the presence of A/E, CM,and.
   1) Pre-Installation Meeting for air barrier / spray insulation will be held on this date.
   2) Air barrier / spray insulation will be reviewed and will require approval by all present.

d. Phase Four: Install the masonry veneer per the approved mockup drawing.
   1) Masonry veneer will be reviewed and will require approval by A/E, CM, and Owner.

e. Phase Five: Clean the mockup veneer.
   1) Pre-Installation Meeting for cleaning of masonry veneer will be held on this date.
   2) Cleaning of mockup veneer will be reviewed and will require approval by A/E, CM, and Owner.

3. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
4. Prior to starting general masonry cleaning, prepare mock-up for cleaning using the same cleaning materials and methods proposed for the Work, and under same weather conditions to be expected during cleaning. Obtain A/E's acceptance of visual qualities before proceeding with masonry restoration. Record cleaning process and results of all testing.
   a. Test materials and methods on samples of adjacent non-masonry materials for possible reaction with cleaning materials, except where materials and methods are known to have a deleterious effect on such materials.
   b. Allow a waiting period of the duration indicated, but not less than 7 calendar days, after completion of sample cleaning to permit a study of sample panels for negative reactions.
5. Protect accepted mockups from the elements with weather-resistant membrane.
6. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship. Panel shall be used as a standard of comparison for all masonry work built of same material.
   a. Approval of mockups is also for other material and construction qualities specifically approved by A/E in writing.
   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by A/E in writing.
7. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Assume responsibility for acceptance of masonry units delivered to Project site being in compliance with specified ASTM requirements for chippage and dimensional tolerances.
   1. Inspect decorative units upon delivery to ensure color match with required materials and accepted mock-up panel.

B. Store masonry units on elevated platforms in a dry location to prevent contamination by mud, dust or materials likely to cause staining or other defects. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
   1. Cover masonry units at all times.
   2. Install decorative CMU as soon as possible after delivery.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
   1. Deliver cementitious and other packaged materials in unopened containers, plainly marked and labeled with manufacturers' names and brands.
   2. Handle cementitious materials in a manner that will prevent the inclusion of foreign materials and damage by water or dampness.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
   1. Stockpile and handle aggregates to prevent contamination from foreign materials. Store different aggregates separately.
   2. Store sand on tarps to keep ground water from wicking into sand.

E. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
   1. Deliver flexible flashing materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
   2. Store flexible flashing materials as recommended by manufacturer. Keep away from open flame or sources of ignition.
   3. Protect insulation from physical damage. Handle boards carefully so corners are not broken off or boards otherwise damaged.

1.9 FIELD CONDITIONS

A. Refer to Division 01 Section "Product Requirements".
   1. Do not apply flexible flashing on wet or damp surfaces.
   2. Apply flashing to surfaces free of dirt, oils, lubricants, and other debris.
   3. Install flexible flashing materials at temperature above 40 deg. F. At temperature below 40 deg. F., apply primer in accordance with flashing manufacturer's recommendations, prior to installation of flashing.
   4. Do not use metal reinforcements or ties coated with loose rust or other coatings, including ice, which will reduce bond.

B. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. Refer to Section 1.8B ("Masonry Protection") in TMS 402/602. Note: Protection is required by Building Code.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
   3. Continue to cover walls until tie-in to roof is complete and top of wall is protected from water penetration.

C. This structure is designed to be self-supporting and stable after the building is fully completed. Protect masonry walls against wind damage by bracing as required until support of walls is integral with the completed building structure. This includes the addition of whatever temporary bracing, guys, or tie-downs that might be necessary. Such material is not shown on the Drawings. If applied, they shall be removed as conditions permit, and shall remain the Contractor's property.
   1. Safety: It is solely the Contractor's responsibility to follow all applicable safety codes and regulations governing this Work.
   2. Load application after building masonry columns, piers, or walls
      a. Do not apply uniform design floor or roof loading for at least 12 hours.
      b. Do not apply concentrated loads for at least 3 days.

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with NCMA TEK 03-01C. Comply with cold-weather construction requirements contained in TMS 402/602 with special emphasis on the following:
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
      a. To assure mortar temperatures between 40 degrees F and 120 degrees F until used, heat mixing water or aggregates when air temperature is between 32 degrees F and 40 degrees F. When the air temperature is between 25 degrees F and 32 degrees F, heat both water and aggregate.
      b. Do not heat water or sand above 160 degrees F.
   2. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes of Brick and Tile Construction by the Brick Industry Association (BIA) and International Masonry Industry All-Weather Council, “Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.”

F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602 and the following:
   1. Masonry construction performed when ambient temperature exceeds 100 degrees F (or 90 degrees F with wind velocities greater than 8 mph) shall conform to the following requirements:
      a. Store materials in cool, shaded location.
      b. Cover aggregate stockpiles with black plastic sheet to retard the evaporation of moisture.
      c. Cool reinforcing steel, metal accessories, wheelbarrows, mixers and mortar boards by flushing with water.
      d. Wet high-suction brick.
      e. Increase lime and/or cement content to maximum allowed under ASTM C270 for mortar type specified.
      f. Increase water content of mortar and grout as needed.
      g. Spread mortar beds no more than 4 feet ahead of masonry, and set units within one minute of spreading mortar.
      h. Moist cure masonry by water fog spray after tooled joints have set.
      i. Cover walls to retard evaporation.
      j. Schedule work to avoid hottest part of day.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany request for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate. Do not change source or brands of masonry mortar materials during the course of the Work.

2.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.
1. Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in TMS 402/602.

B. Regulatory Requirements: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:
1. TMS 402/602 "Building Code Requirements and Specification for Masonry Structures."
   a. Maintain one copy of the standard in project field office at all times during construction. Contractor's supervisory personnel shall be thoroughly familiar with this material as it applies to the project and shall be present at all times and direct work performed under this Section.
2. National Concrete Masonry Association (NCMA)
   a. NCMA TEK Bulletin 03-01C "All Weather Concrete Masonry Construction".
   b. NCMA TEK Bulletin 03-02A "Grouting Concrete Masonry Walls".
   c. NCMA TEK Bulletin 03-08A "Concrete Masonry Construction".
   d. NCMA TEK Bulletin 03-04C "Bracing Concrete Masonry Walls Under Construction".
   e. NCMA TEK Bulletin 05-02A "Clay and Concrete Masonry Banding Details".
   f. NCMA TEK Bulletin 07-01D "Fire Resistance Rating of Concrete Masonry Assemblies".
   g. NCMA TEK Bulletin 08-02A "Removal of Stains from Concrete Masonry."
   h. NCMA TEK Bulletin 08-03A "Control and Removal of Efflorescence."
   i. NCMA TEK Bulletin 08-04A "Cleaning Concrete Masonry".
   j. NCMA TEK Bulletin 09-01A "Mortars for Concrete Masonry."
   k. NCMA TEK Bulletin 10-01A "Crack Control in Concrete Masonry Walls".
   l. NCMA TEK Bulletin 10-02D "Control Joints for Concrete Masonry Walls – Empirical Method".
   m. NCMA TEK Bulletin 10-03 "Control Joints for Concrete Masonry Walls – Alternative Engineering Method.
   n. NCMA TEK Bulletin 10-04 "Crack Control for Concrete Brick and Other Concrete Masonry Veneers".
   o. NCMA TEK Bulletin 12-04D "Steel Reinforcement for Concrete Masonry".
   p. NCMA TEK Bulletin 14-04B "Strength Design Provisions for Concrete Masonry."
   q. NCMA TEK Bulletin 14-07C "Allowable Stress Design of Concrete Masonry (2012 IBC & 2011 MSJC)."
   r. NCMA TEK Bulletin 19-04A "Flashing Strategies for Concrete Masonry Walls".
   s. NCMA TEK Bulletin 19-05A "Flashing Details for Concrete Masonry Walls."
   t. NCMA TEK Bulletin 19-07 "Characteristics of Concrete Masonry Units with Integral Water Repellent".
3. ASTM International:
   a. ASTM C33 "Standard Specification for Concrete Aggregates."
   b. ASTM C90 "Standard Specification for Loadbearing Concrete Masonry Units."

c. ASTM C91 “Masonry Cement.”
d. ASTM C140 “Standard Test Methods of Sampling and Testing Concrete Masonry Units.”
e. ASTM C144 “Standard Specification for Aggregate for Masonry Mortar.”
f. ASTM C150 “Standard Specification for Portland Cement.”
g. ASTM C207 “Standard Specification for Hydrated Lime for Masonry Purposes.”
h. ASTM C270 “Standard Specification for Mortar of Unit Masonry.”
i. ASTM C426 “Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.”
j. ASTM C 476 “Standard Specification for Grout for Masonry”.
k. ASTM C780 “Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.”
l. ASTM C979 “Standard Specification for Pigments for Integrally Colored Concrete.”
m. ASTM E514 “Standard Test Method for Water Penetration and Leakage Through Masonry”.

4. International Masonry Industry All-Weather Council (IMIAWC).
   a. “Recommended Practices and Guide Specifications for Cold Weather Masonry Construction – 1993”.
5. International Masonry Institute
   a. “Internal Bracing Design Guide for Masonry Walls Under Construction”.
   b. Detailing Series.
6. Underwriters’ Laboratory Inc. (UL)
   a. UL “Building Materials Directory”.
   b. UL 618 “Standard for Concrete Masonry”.
7. Brick Industry Association (BIA)
   a. BIA Technical Notes No. 1 – Revised 1992: All weather construction.
   b. BIA M1-88: Specifications for Portland Cement Lime Mortar for Brick Masonry.
   c. BIA Technical Notes No. 7 – Water Penetration Resistance – Design and Detail.
   d. BIA Technical Notes No. 18A – Accommodating Expansion of Brickwork.
   e. BIA Technical Notes No. 20 – Revised 1990: Cleaning Brick Masonry.
   f. BIA Technical Notes No. 27 – Revised 1994: Brick Masonry Rain Screen Walls.
   g. BIA Technical Notes No. 28B – Revised 1987: Brick Veneer.
   h. BIA Technical Notes No. 28C – Thin Brick Veneer.

2.3 MASONRY UNITS, GENERAL

A. Masonry Standard: Comply with ACI/ASCE 6/TMS 602, unless modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

C. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide shapes indicated and as follows:
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide bullnose units for outside corners and at sills, unless otherwise indicated or sill is indicated to receive additional finish materials.
      a. At base of wall and where indicated (first CMU course above floor), provide exposed square edge external corners. Above base transition square edge to the bullnose above by grinding.

b. Provide bullnose unit with 1 inch radius bullnose (BN1), unless otherwise noted.
c. Provide double bullnose units 1 inch radius bullnose (BN2) at top of half wall as indicated.

3. Provide two core type masonry units where required to receive vertical reinforcing.
4. Bond beam units shall be such that where two reinforcing steel bars are required in the bond beams, bars may be located not greater than 2-5/8 inch from both faces of the unit. Bond beam units that do not allow the two bars to be separated and to be within 2 5/8" of each face will not be acceptable.

B. Concrete Masonry Units: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3750 psi**.** Design compressive strength of masonry system (f'm) is to be no less than 2500 psi with Type M or S mortar.
2. Weight Classification: Normal weight.
3. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
a. Where special finishes are indicated, provide units with exposed faces of the following general description.
1) Provide single scored units where indicated (01SCV). Center score with a simulated recessed mortar joint 3/8 inch wide, to provide an apparent 8 by 8 inch nominal face in the finished wall surface. Provide scored joint one or two faces as required by conditions of installation.
a) Where required for patching to match existing.

2.5 MASONRY LINTELS

A. Concrete Lintels: Not acceptable**.**

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from specially formed "U" shaped lintel units with reinforcing bars placed as indicated and filled with coarse grout. Open-bottom, bond-beam type units are not acceptable for use as reinforced lintels. Cure prefabricated lintels before handling and installing. Temporarily support built-in-place lintels until cured. Prefabricated lintels shall have a faux head joint pattern on their exposed faces, and shall have their top side clearly marked in the factory. Prefabricated lintels are to be installed such that the faux head joint pattern aligns with that of the surrounding masonry.

2.6 BRICK

A. General: Provide shapes indicated and as follows:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: ASTM C 216, Grade SW, Type FBX or FBS.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
2. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
3. Modular: Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
4. Utility: Size (Actual Dimensions): 3-5/8 inches wide by 3-5/8 inches high by 11-5/8 inches long.
5. Norman: Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 11-5/8 inches long.

6. Application: Use where brick is exposed, unless otherwise indicated.
7. Products:
    a. Brick Type 1, Color A: Norman
        1) Color A: Belden Brick Company, Belcrest 560 SMH, velour.
    b. Brick Type 2, Color A: Modular, Soldier and Rowlock Course.
        1) Color A: Belden Brick Company, Belcrest 560 SMH, velour.
    c. Brick Type 3, Color B: Utility
        1) Color B: Belden Brick Company, 8632 Light A, velour.
    d. Brick Type 4, Color B: Quad, 8 inch by 8 inch.
        1) Color A: Belden Brick Company, Belcrest 560 SMH, velour.
    e. Brick Type 4A, Color B: Quad, 8 inch by 8 inch, special sill shape.
        1) Color A: Belden Brick Company, Belcrest 560 SMH, velour.
    f. Brick Type 5, Color B: Special Shape, 5-5/8 inch D x 3-5/8 inch H x 11-5/8 inch L
        1) Color B: Belden Brick Company, 8632 Light A, velour.

C. Glazed Brick, Grade MW or Grad eSW, Type FBX or FBS, Interior Class.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Glen-Gery Corporation.
2. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
3. Provide Type I (single-faced units) where only one finished face is exposed when units are installed, and provide Type II (double-faced units) where two opposite finished faces are exposed when units are installed.
4. Application: Use where indicated.
5. Colors: As indicated in “List of Finishes”.

2.7 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color(s) indicated.
1. Alkali content shall not be more than 0.6 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 270, Type S.

D. Masonry Cement: ASTM C 91 veneer only.
1. Products:
    a. Brixment or Velvet; Essroc, Italcementi Group.
    b. Mortamix Masonry Cement or Rainbow Mortamix Custom Buff Masonry Cement or White Mortamix Masonry Cement; Holcim (US) Inc.
    c. Magnolia Masonry Cement or Lafarge Masonry Cement or Trinity White Masonry Type S or Trinity White Masonry Type N; Lafarge North America Inc.
    d. Lehigh Masonry Cement or Lehigh White Masonry Cement; Lehigh Cement Company
    e. Richmortar; CEMEX.
    f. Miami Masonry Cement; Fairborn Cement Company.

E. Mortar Cement: ASTM C 1329.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Products:
    a. Bayferrox Iron Oxide Pigments; Bayer Corporation, Industrial Chemicals Div.
    b. True Tone Mortar Colors; Davis Colors.
    c. MasterColor; Master Builders Solutions.
    d. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.
    e. Prism Pigments, a Division of Mix Manufacturing, Inc.

f. Euclid Chemical Company.
g. Lanxess Corp.
h. Acme-Hardesty Co., Acme-Shield Plus Admixture; Cargill.

G. Colored Cement Product: Packaged blend made from Portland cement and lime, masonry cement, or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Products:
a. Colored Portland Cement-Lime Mix:
1) Rainbow Mortamix Custom Color Cement/Lime; Holcim (US) Inc.
2) Eaglebond; Lafarge North America Inc.
3) Lehigh Custom Color Portland/Lime Cement; Lehigh Cement Company.
4) Color Mortar Blend; Glen-Gery Corp.
5) Salyor's PLUS; Essroc.
6) PCL; CEMEX.
b. Colored Masonry Cement:
1) Flamingo-Brixment; Essroc, Italcementi Group.
2) Rainbow Mortamix Custom Color Masonry Cement; Holcim (US) Inc.
3) Magnolia Masonry Cement; Lafarge North America Inc.
4) Lehigh Custom Color Masonry Cement; Lehigh Cement Company.
5) Coosa Masonry Cement; National Cement Company, Inc.
6) Richcolor Masonry Cement; CEMEX.
7) Miamicolor Masonry Cement; Fairborn Cement Company.
2. Formulate blend as required to produce color(s) indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Pigments shall not exceed 10 percent of Portland cement by weight.
4. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

H. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color(s), where required for mix design.

I. Aggregate for Grout: ASTM C 404.
1. Fine Aggregates: ASTM C404, clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
2. Coarse Aggregates: ASTM C404, clean, uncoated, pea gravel containing no clay, mud, loam, or foreign matter. Maximum aggregate size 3/4 inch.

J. Admixtures, General:
1. No air-entraining admixtures or material containing air-entraining admixtures.
2. No antifreeze compounds shall be added to mortar.
3. No admixtures containing chlorides shall be added to mortar.

K. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, ASTM C 1384, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Products:
a. Accelguard 80; Euclid Chemical Company.
b. Morset; GCP Applied Technologies.
c. MasterSet AC 534 or MasterSet FP 20; Master Builders Solutions.

L. Water: Conform to ASTM C1602 for mixing water.

2.8 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60 (Grade 420).
   1. Size, length, and spacing shall be as indicated.
   2. Where No. 3 and larger are indicated, they shall be deformed steel, conforming to ASTM A615, Grade 60.
   3. Use #4 spacer bars at 48 inch spacing connected to longitudinal reinforcing bars in concrete masonry bond beams to hold bars in proper location.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.
   1. Products:
      a. No. 376, 377, 378, or 379 Rebar Positioner; Heckmann Building Products Inc.
      b. #RB or #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
      c. Figure-8, Double Figure-8, O-Ring or Double O-Ring Rebar Positioner; Wire-Bond.

C. Masonry Joint Reinforcement, General: ASTM A 951 and as follows:
   1. Provide welded wire units prefabricated in straight lengths of not less than 10 foot, with matching corner ("L") and intersection ("T") units.
   2. Fabricate from cold-drawn steel wire complying with ASTM A82, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1-1/2 to 2 inches less than thickness of wall or partition.
   3. Wire shall be galvanized in accordance with the following:
      a. Joint reinforcement, interior walls or exposed to relative humidity less than or equal to 75 percent
         1) ASTM A641, mill galvanized (0.10 oz. per sq.ft.)
      b. Wire ties or anchors in interior walls or exposed to relative humidity less than or equal to 75 percent
         1) ASTM A641 (0.35 oz. per sq.ft.)
      c. Joint reinforcement, wire ties, or anchors in exterior walls or a mean relative humidity exceeding 75 percent (pool environment)
         1) ASTM A153, Class B (1.50 oz. per sq.ft.)
      d. Sheet metal ties or anchors, interior walls or exposed to relative humidity less than or equal to 75 percent
         1) ASTM A653, G60 (0.60 oz. per sq.ft.)
      e. Sheet metal ties or anchors in exterior walls or a mean relative humidity exceeding 75 percent (pool environment)
         1) ASTM A153, Class B (1.50 oz. per sq.ft.)
      f. Steel plates and bars
         1) ASTM A153, Class B
   4. For single wythe interior CMU walls, provide ladder type joint reinforcing fabricated with two W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
   5. For interior walls consisting of CMU backup and face brick or CMU veneer, provide ladder type joint reinforcing fabricated with three W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
   6. For multi-wythe interior walls consisting of two wythes of CMU, provide ladder type joint reinforcing fabricated with four W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
   7. Multi-wythe exterior walls consisting of CMU backup, insulated cavity, and exterior face brick or CMU veneer.
      a. When both wythes are to be constructed simultaneously:
         1) Provide ladder type joint reinforcing fabricated with three W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.

b. When each wythe is to be constructed separately:
   1) Backup Wythe
      a) Provide adjustable ladder type joint reinforcing fabricated with two W1.7 or 0.148 inch steel side rods, W1.7 or 0.148 inch cross rods, 3/16 inch eyes and 3/16 inch double legged pintles. Longitudinal rods shall be spaced for each face shell of CMU; eye sections shall extend into wall's cavity, and pintles shall rest upon bed joints of veneer. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
   2) Veneer Wythe (CMU)
      a) Provide ladder type horizontal joint reinforcing fabricated with two W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods continuous joint. Joint reinforcing shall be placed in every other CMU veneer joint or not more than 16 inches o.c.

c. For multi-wythe walls in which the coursing in the face wythe does not align vertically with the coursing in the backup wythe use:
   1) Stone Tab 3700 with 1100 triangular ties; Wire-Bond.
   2) TIE-HVR-195VB; Hohmann & Barnard, Inc.

d. For banding details in which CMU and clay masonry are combined:
   1) Refer to NCMA TEK 05-02A.
      a) Provide ladder type horizontal joint reinforcing fabricated with two W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Reinforce joints separating two different materials.

8. For foundation walls consisting of two wythes of CMU, provide ladder type joint reinforcing fabricated with four W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Joint reinforcing shall be placed in every CMU joint or no more than 8 inches o.c. Side rods shall align with face shells of CMU.
9. For single wythe foundation walls, provide ladder type joint reinforcing fabricated with two W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods. Joint reinforcing shall be placed in every CMU joint or no more than 8 inches o.c.
10. For joint reinforcing in walls, other than those described above, refer to Drawings for particular requirements.
11. All ladder type joint reinforcing shall have cross rods spaced at 16 inches o.c.
12. All ladder type joint reinforcing shall be lapped 6 inches minimum.
13. All ladder type joint reinforcing shall be discontinuous across movement joints.

2.9 TIES AND ANCHORS

A. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
   1. Ensure components and materials are compatible with specified accessories and adjacent materials.

B. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with subparagraphs below, unless otherwise indicated.
   1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 1064; with ASTM A 641, Class 1 coating, provide in interior walls where humidity is less than 75 percent.
   2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 1064; with ASTM A 153, Class B-2 coating, unless otherwise noted.
   3. Galvanized Steel Sheet: ASTM A 653, Commercial Steel, G60 (Z180) zinc coating, provide in interior walls where humidity is less than 75 percent.
   4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153, unless otherwise noted.
   5. Steel Plates, Shapes, and Bars: ASTM A 36.
   6. Stainless Steel bars: ASTM A 276 or ASTM A 666, Type 304.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
   1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units or hollow units laid with cells horizontal.
   2. Where wythes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
   3. Wire: Fabricate from 3/16-inch diameter, hot-dip galvanized steel wire. Mill-galvanized wire ties may be used in interior walls, except in spaces where relative humidity can be expected to exceed 75-percent relative humidity (showers, locker rooms and pool environment) or where otherwise indicated.
      a. Utilize galvanized steel wire or stainless-steel wire in all walls interior and exterior within pool environment areas.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls, unless otherwise indicated.
   2. Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.188-inch diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls, unless otherwise indicated.

E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustments but resist tension and compression forces perpendicular to plane of wall.
   1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.105 inch thick steel sheet, galvanized after fabrication.
   2. Tie Section: Triangular-shaped wire tie made from 0.187 inch diameter, hot-dip galvanized steel wire.

F. Partition Top anchors: 0.105-inch thick metal plate with 3/8-inch diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins, unless otherwise indicated.
   1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153.

H. Adjustable Masonry-Veneer Anchors: Provide either screw-attached, masonry-veneer anchors with separate horizontal reinforcing .
   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch.
      b. Anchor shall meet or exceed requirements for air leakage and water penetration established for Project.
   2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
      a. Fabricate sheet metal anchor sections and other sheet metal parts from 0.067-inch thick, steel sheet, galvanized after fabrication.
      b. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188-inch diameter, hot-dip galvanized steel wire.
      c. Products:
         1) 315-D with 316 or Pos-I-Tie or 213-2X; Heckmann Building Products Inc.
         2) HB-213 with 2X Hook or Adjusto-Tie; Hohmann & Barnard, Inc.
         3) 1004, Type III or RJ-711; Wire-Bond.
         4) Thermal-Grip Masonry Veneer Anchor Pos-i-tie: TRUFAST Walls.

3. Anchor Section: Corrosion-resistant, self-drilling, eye-screw designed to receive wire tie. Eye-screw has spacer that seats directly against framing and is same thickness as sheathing and has gasketed, washer head or tape to protect hole in sheathing.
    a. Products
        1) Pos-I-Tie; Heckmann Building Products.
        2) SureTie; Wire Bond.
        3) X-Seal Anchor or 2 Seal Tie Veneer Anchor; Hohmann and Barnard.
        4) Thermal Grip MVA or Pos-i-tie: TRUFAST Walls.
4. Drill Screws: Provide either of the following types:
    a. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
        1) Products:
            a) Teks Maxiseal with Climaseal finish; ITW Buildex.
            b) Elco Dril-Flex with Stalgard finish; Textron Inc., Textron Fastening Systems.
            c) 4000 with Climaseal finish; Wire-Bond.
    b. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads.
        1) Products:
            a) Scots long life Teks; ITW Buildex.
            b) Teks Maxiseal with Climaseal finish; ITW Buildex.
            c) Elco Dril-Flex with Stalgard finish; Textron Inc., Textron Fastening Systems.
            d) SFS Stadler SX Fastener; Wire-Bond.
            e) SDS Style; TRUFAST Inc.
5. Channel Slot System:
    a. Vertical Channel: 1-3/8-inch wide by 1/2- or 5/8-inch deep by 60-inch long by minimum 16-gauge hot-dip-galvanized steel channel designed for surface-mounting and having discontinuous slotted holes for inserting veneer ties and minimum 12-gauge triangular spacer clips or factory-welded prongs sized to penetrate depth of cavity insulation and transfer compression loads to back-up substrate.
        1) Acceptable Products: Subject to compliance with requirements, provide one of the following.
            a) 133 Long Channel Slot with Channel Slot T-Clips and 133-P Bridge Plate and Fastener; Heckmann.
            b) 362-CX Gripstay Channel; Hohmann and Barnard.
            c) 1301-X; Wire-Bond.
    b. Veneer Anchor or Tie: Factory-assembled 12-gauge slot clip attached to a 3/16-inch diameter wire triangle sized for cavity.
        1) Acceptable Products: Subject to compliance with requirements, provide one of the following.
            a) Tri-03 Triangle Tie with Channel Clip; RKL Building Specialties.
            b) 129 Channel Slot Triangular Tie; Heckmann.
            c) 363 Flexible Gripstay Anchor; Hohmann and Barnard.

2.10 MISCELLANEOUS ANCHORS

A. Stabilization Anchors: Provide where masonry walls intersect concrete or existing masonry walls. Bonds masonry walls and restrains lateral movement while allowing expansion and control joints to perform as designed.
    1. Products:
        a. Slip Set Stabilizer; Hohmann & Barnard, Inc.
        b. 1700; Wire-Bond.

B. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.

C. Intersecting Masonry Wall Joint Reinforcing: Where interior masonry walls supported on slabs intersect masonry walls, provide hot dip galvanized 1/2 inch by 16 gauge mesh ties spanning horizontally.
   1. Products:
      a. #MWT Mesh Wall Tie; Hohmann & Barnard, Inc.
      b. Wire Mesh 269; Heckman Building Products.
      c. Wire Mesh Tie; Wirebond.
      d. Mesh Tie; MasonPro.

2.11 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
   1. Reglets/Receivers: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with mitered and welded corners and junctions. Formed reglets must comply with requirements of Division 07 Section “Sheet Metal Flashing and Trim”.
      a. Materials, provide one of the following:
         1) Stainless Steel: 0.0187 inch thick (fka 26 gauge).
         2) Aluminum-Zinc Alloy-Coated Steel: 0.0217 (fka 26 gauge).
         3) Galvanized Steel: 0.0217 inch thick (fka 26 gauge).
         4) Pre-Painted Metallic-Coated Steel: 0.0217 inch thick (fka 26 gauge).
      b. Masonry Type: Provide extension leg to extend to face of inner CMU wythe (or sheathing with a veneer wall configuration) with an off-set top flange.
   2. Metal Terminations for Flexible Flashing: Fabricate from 26 or 28 gauge stainless steel. Extend into wall as indicated (but not less than 3 inches) and out to exterior face of wall. At exterior face of wall, bend metal down at an angle and back on itself for 3/4 inch to form a drip edge.
      a. Provide a bead of elastomeric silicone sealant between lintel and drip edge to prevent water from wicking back onto lintel.
      b. Provide hemmed edge turning back 180 degrees to be flush with face of veneer at base of wall only.
   3. Stainless steel end dams may also be used in conjunction with flexible flashing.

B. Flexible Flashing: For flashing not exposed to the exterior, coordinate with air barrier system and use the following, unless otherwise indicated:
   1. Provide one of the following:
      a. York 304 SA Self-Adhered, Stainless Steel; York Manufacturing, Inc.
      b. Gorilla Flash SS Peel and Stick Butyl; STS Coatings, Inc.
      c. IPCO Self-Adhesive Stainless Steel; Illinois Products, Inc.
      d. TK Self-Adhering Stainless Steel TWF; TK Products, Inc.
      e. Mighty-Flash-SA; Hohmann and Barnard Inc.
      f. Bond-N-Flash S.A.; Wire Bond
   2. Characteristics/Properties
      a. Type: Stainless steel core with one stainless steel face with a butyl block co-polymer adhesive.
      b. Stainless steel type: 304, ASTM A 167.
      c. Adhesive: Block co-polymer.
      d. Size: Manufacturer’s standard width rolls.
      e. Performance attributes
         1) Tensile strength, > 90,000 psi
         2) Puncture resistance, > 2,500 pounds average
         3) When tested as manufactured, product resists growth of mold pursuant to test method ASTM D 3273.
   3. Accessories: Products shall be as recommended by flashing manufacturer
      a. Polyether Sealant
         1) UniverSeal US-100; York Manufacturing, Inc.

2) GreatSeal LT-100; STS Coatings, Inc.
3) R-Guard Joint Seam Sealer; Prosoco, Inc.
4) HB Sealant; Hohmann and Barnard Inc.
5) Quick Set Sealant; Wire Bond

b. Splice Tape/Transition Flashing (Self Adhered)
1) York 304SS; York Manufacturing, Inc.
2) IPCO Self-Adhering Stainless Steel Flashing; Illinois Products, Inc.
3) X-Seal Splice Tape; Hohmann and Barnard Inc.
4) Anchorseal Tape: Wire Bond

c. Corner and End Dams: Use only 26 gauge stainless steel pre-manufactured corners.

d. Water-Based Primer: Provide when recommended by manufacturer for application indicated.
1) Primer-SA; Hohmann and Barnard Inc.
2) Aqua Flash Primer; Wire Bond

C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
1. Solder for Stainless Steel: ASTM B 32, Grade Sn96, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight. Sealant shall be approved by flexible flashing manufacturer for use with flashing.

D. Adhesives, Mastic, Sealant, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

E. Cavity Bridge: Stainless steel fabrication, Type 304 grade, 26 gauge. Provide pre-drilled holes as required for anchors to substrate
1. Size and Confirguration as indicated on Drawings.

F. Termination Bar: 26 gauge, minimum predrilled stainless-steel approximately 1-1/2 inch wide by 8 foot sections, 45 deg. lip at top for sealant, to be used at top of flashing to secure it to backup.
1. Acceptable Manufacturers/Products
a. T-2 Termination Bar; Hohmann & Barnard, Inc.
b. #4210 Termination Bar; Wire-Bond.
c. Stainless Steel Accessories 45; York Flashings.
d. Stainless Steel Termination Bar; IPCO.

2.12 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.
1. Products:
a. Neo-Seal IV 2218-3/Everlastic 1056 Joint Filler; Williams Products, Inc.
b. #NS-Closed Cell Neoprene Sponge; Hohmann and Barnard, Inc.
c. Neocell; IPCO.
d. #NS-Closed Cell; National Construction Materials Corp.
e. Sandell's Closed Cell Neoprene; Sandell Construction Solutions.

B. Thermal Barrier (Break); Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. Nominal density of 4.4 lb./cu.ft.
2. Moisture Resistance; ASTM C 1104: Moisture Sorption, 0.03 percent.
3. Thermal Resistance; ASTM C 518: R-value/inch at 75 deg. F., 4.2 hr.ft.^{2}. F/Btu.

C. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

D. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

E. Weep/Vent Products: Use one of the following, unless otherwise indicated:
   1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color(s) selected from manufacturer's standard.
      a. Products:
         1) Mortar Maze weep vent; Advanced Building Products Inc.
         2) No. 85 Cell Vent; Heckmann Building Products Inc.
         3) Quadro-Vent; Hohmann & Barnard, Inc.
         4) Cell Vent, 3601; Wire-Bond.
         5) Sandell's Cell Vents; Sandell Construction Solutions.
         6) Cell Vent; MasonPro.
         7) Cell Vent; Mortar Net Solutions.
   2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color(s) selected from manufacturer's standard.
   3. Adjustable Weep Vent: IPCO.
   4. Stainless Steel Weep/Vent: Type 304 stainless steel.
      a. York Manufacturing Inc.

F. Cavity Mortar Protection Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity. Installer shall select product thickness(es) in the field based on observed clear air space between cavity insulation and outer wythe. Clear air space shall not exceed selected product thickness by more than 0.40-inch. Where clear air space exceeds manufacturer's thickest available product by more than 0.40-inch, Installer shall insert a supplemental wythe of extruded polystyrene (XEPS) insulation on inner face, sized to make up the difference.
   1. Provide one of the following types:
      a. Profiled strips, 10-inches high, with dovetail shaped notches 7-inches deep that prevent mesh from being clogged with mortar droppings.
      b. Rectangular strips, not less than 10-inches high, with or without dimpled surface, designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
      c. Sheets or rectangular strips installed continuously from flashing to height indicated, to prevent weep holes from being clogged with mortar.
   2. Products:
      a. Mortar Break; Advanced Building Products Inc.
      b. CavClear Masonry Mat; Archovations, Inc.
      c. Mortar Web/Trap; Hohmann & Barnard Inc.
      d. Mortar Mitt; Sandell.
      e. Driwal Mortar Deflection/Driwall Masonry Vent System; Keene Building Products.
      f. Mason ProNet DT; MasonPro.
      g. Mortar Net; Mortar Net Solutions.
      h. Weep-Net; York Manufacturing Inc.
   3. Fabric Mesh to Prevent Clogging of Weep Holes (Option): Non-woven polyester fabric used as part of masonry cavity drainage systems with flashing, weep holes or weep vents. Drapes over interior side of weep holes/vents keeping them free of mortar and debris; routes water to flashing and to weeps by draining through body of product.
      a. Materials: Recycled polyester, free-draining mesh, made from polymer stands that will not degrade within cavity wall.
      b. Mold Growth Resistance: In compliance with ASTM D 3273 and ASTM G 21.

G. Grout Sample Box: When approved by the A/E, grout sample box shall be proven by tests to yield comparable compressive strength values to samples cast by traditional methods regardless of CMU moisture content. Box shall perform as a mold and transport/shipping container in one as specified by ASTM C 1019.
   1. Basis-of-Design: Deslauriers, Inc.

H. Column Isolation: Around all columns in masonry walls, provide 1/2 inch minimum isolation material to prevent the masonry from coming in contact with the displaced column during loading and to prevent mortar from being within the same joint.
   1. Products:
      a. Ceramar Flexible Foam; W.R. Meadows, Inc.
      b. Econ-O-Foam; Williams Products.
      c. Nomaboard; Nomaco Inc.
      d. Column Backboard; Williams Products.
      e. Column Wrap; MasonPro.

I. Grout Stop: Fiberglass, galvanized steel, or polypropylene screen.
   1. Products:
      a. Metal Lath 268; Heckmann Building Products, Inc.
      b. MGS - Mortar/Grout Screen; Hohmann & Barnard, Inc.
      c. Grout Stop 3612; Wire-Bond.
      d. Grout Stop; MasonPro.

J. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 degrees F (minus 32 degrees C). Provide products with low compression set and of size and shape to provide a seal for compartmentalization.

2.13 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Board Insulation with Increased R-Value: ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for 1-inch thickness of 5.6 deg F x h x sq. ft./Btu at 75 deg F at 5 years; closed-cell product with a carbon-black filler and extruded with an integral skin.
   1. Products:
      a. Cavitymate Ultra; Dow Chemical.
      b. Foamular, High-R-CW Plus; Owens Corning.
      c. Neopor GPS Smart Insulation; MBCC Group.
   2. Thickness/R-Value: 1.75 inch thick/R-10.00.
   3. Water Absorption: maximum 0.1 percent by volume (ASTM C272-91).
   4. Surface Burning Characteristic (ASTM C578-95).
      a. Flame Spread: 0.
      b. Smoke Developed: 155.

B. Polyisocyanurate Board Insulation: Not acceptable.

C. Adhesive: Type recommended by insulation board manufacturer for application indicated.
   1. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

D. Sealant: As recommended by insulation board manufacturer for application indicated.
   1. Sealant for Sealing Joints: Product shall retard moisture penetration at insulation joint for a weather barrier at the outside surface of the insulation.

E. Joint Tape: As recommended by insulation board manufacturer for application indicated.

2.14 MASONRY CLEANERS AND ACCESSORIES

A. Preformed Expansion Joint Filler: Provide closed cell sponge neoprene expansion joint filler conforming to ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated.

B. Bituminous Coating: Cold applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold applied asphalt emulsion complying with ASTM D1187, Type II.

C. Masonry Cleaners: Provide one of the following cleaning products expressly approved for intended use by cleaner manufacturer and manufacturer of unit being cleaned as verified on "mock-up".
   1. Job Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.
   2. Proprietary Acidic Cleaner: Manufacturer's standard strength, general purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned. Do not use products containing hydrochloric (muriatic acid, hydrofluoric acid, or ammonium bifluoride.
      a. For brick masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface acting acids, chelating, and wetting agents.
         1) Products:
            a) Sure Klean No. 600 Detergent; ProSoCo., Inc.
            b) 202 Detergent; Diedrich Technologies.
            c) NMD 80 New Masonry Detergent; EaCo Chem, Inc.
      b. For dark colored brick masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface acting acids and special inhibitors.
         1) Products:
            a) ProSoCo., Inc.; Sure Klean No. 101 Lime Solvent.
            b) Diedrich Technologies; 200 Lime Solv.
            c) EaCo Chem, Inc., NMD 80 New Masonry Detergent.
      c. For brick masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic acids and special inhibitors.
         1) Products:
            a) Sure Klean Vana Trol; ProSoCo., Inc.
            b) 202 Vana-Stop; Diedrich Technologies.
            c) NMD 80 New Masonry Detergent; EaCo Chem, Inc.

D. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated or recommended for pressure, measured at spray tip, and for volume. Adjust pressure and volume, as required, to ensure that damage to masonry does not result from cleaning methods.
   1. For chemical cleaner spray application, provide a low pressure tank or chemical pump suitable for the chemical cleaner indicated, equipped with a cone-shaped spray tip.
   2. For water spray application, provide a fan-shaped spray tip that disperses water at an angle of not less than 15 degrees.

2.15 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. When specifically approved by the A/E, admixtures shall meet ASTM C1384 Standard Specification for Admixtures for Masonry Mortars.
   1. Do not use calcium chloride in mortar or grout.
   2. Maintain workability of standard grey mortar by remixing or retempering. No mortar shall be used beyond 2-1/2 hours after mixing. Do not retemper colored pigmented mortar because color variations may result.
   3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar Batching
   1. For each unit volume of cementitious materials, provide 2.25 to 3.5 volumes of aggregates.

2. In a running mechanical paddle mixer, add 2/3 of the water and 1/2 of the aggregate (sand), then add the cementitious materials. Follow by adding the remaining water. Mix for a minimum of 5 minutes, adding water if required to produce a workable consistency.
    a. Do not hand mix mortar, unless approved in writing by A/E.

C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

D. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
1. For masonry below grade use Type M, where indicated only.
2. For masonry, use Type S, unless otherwise noted.
3. For non-load bearing interior partitions, use Type N or S, unless otherwise noted.
4. For exterior, above-grade, masonry veneer, use Type N or S, unless otherwise noted.

E. Use natural (noncolored) mortar for the following:
1. Concrete masonry units, unless otherwise noted.

F. Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color indicated or, if not indicated, as selected from manufacturer's standard formulation to compliment adjacent units.
1. Use colored pigmented mortar for the following locations:
    a. Clay face brick
    b. Glazed brick
    c. Cast stone
2. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color(s) required. Limit pigments to the following percentages of cement content by weight:
    a. For mineral oxide pigments and Portland cement lime mortar, not more than 10 percent.
    b. For carbon black pigment and Portland cement lime mortar, not more than 2 percent.
    c. For mineral oxide pigments and masonry cement mortar not more than 5 percent.
    d. For carbon black pigment and masonry cement mortar, not more than 1 percent.
3. Color: As selected by A/E from Manufacturer's standard colors..
    a. Note: Multiple colors will be selected for exterior face brick and cast stone. Separate color may be selected for interior glazed brick.

G. Colored-Aggregate Mortar: Use colored aggregates and natural color or white cement as necessary to produce required mortar color(s).

H. Pointing mortar shall conform to ASTM C270, except that all sand shall pass a No. 16 sieve. Nonstaining and dirt resistant mortar shall be used to which ammonium stearate or calcium stearate is added to the amount equal to 3 percent of the weight of the cement used.
1. Pointing mortar shall be proportioned by volume with one part portland cement, 1/8 part Type S hydrated lime, and 2 parts graded (50 mesh or finer) sand to which ammonium stearate or calcium stearate is added in an amount equal to 2 percent of the weight of the cement used. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
2. Add colored mortar pigment to produce mortar colors required. Coordinate with CMU manufacturer to produce color(s) required to match CMU for repair of face.
3. Use pointing mortar to repair chipped CMU units.

I. Grout for Unit Masonry (by Strength): Comply with ASTM C 476. Grout mixes shall be designed by strength, unless specifically noted otherwise in the Contract Documents.

1. Conventional Grout
    a. General: Do not use admixtures, including pigment, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not lower the freezing point of grout by use of admixtures or anti-freeze agents.
        1) Admixtures containing chlorides in excess of 0.2 percent chloride ions are not permitted to be used.
        2) Antifreezes are prohibited for use in grouts.
        3) Flyash: ASTM C618-89a, Type C or F may be substituted for up to 20 percent of the total cementitious materials in the gout mix.
    b. Grout mixes shall be plant mix or factory blended (dry mix with water added at Project site).
    c. Field mixed grout designs are not acceptable.
    d. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in TMS 402/602 for dimensions of grout spaces and pour height.
    e. Provide grout with a slump of 8 to 10 inches as measured according to ASTM C 143.
2. Self-Consolidating Grout
    a. Jobsite proportioning of self-consolidating grout is not permitted. Do not add water at jobsite except in accordance with self-consolidating grout manufacturer's instructions.
    b. Admixtures for Self-Consolidating Grout
        1) High-Range Water-Reducing Admixture
        2) Viscosity-Modifying Admixture
    c. Slump Flow: 24 to 30 inches as determined in accordance with ASTM C1611.
    d. Visual Stability Index (VSI): Less than or equal to 1 as determined in accordance with ASTM C1611, Appendix X.1.
    e. Consolidation or reconsolidation is not required for self-consolidating grout.

2.16 SOURCE QUALITY CONTROL

A. Concrete Masonry Inspection
1. Refer to Division 01 Section "Quality Requirements".
2. Materials may require testing and retesting, as directed by the A/E, during the progress of the Work. Allow free access to material stockpiles, facilities and completed construction.
3. See structural plans for special inspection requirements for masonry walls.

B. Verification of Performance: Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe and before capping wall.
1. Contractor shall perform initial tests in the presence of CM, A/E,, flexible flashing manufacturer, and General Trades Contractor. After successful initial tests have been performed additional testing shall be performed in the presence of theso tests can be witnessed and documented. CM, A/E,, andshall be notified when testing is to occur, in case they too wish to witness the testing, otherwisewill submit documentation to A/E as work progresses.
    a. Testing shall occur at first 200 square feet of masonry wall and include a window opening and opening flashing.
2. Contractor shall hold water hose and with standard water pressure, force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing reinspected and repaired.
4. Water test shall be repeated where flashing was repaired.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work in accordance with TMS 402/602, Article 2.1.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify critical steel elevations to ensure flashing will be installed at proper locations.

B. Before installation, examine rough-in and built-in construction for piping systems or conduit to verify actual locations of connections.
   1. Do not install anything in the cavity space of the exterior wall that:
      a. Diminishes the designed R-Value of the cavity-wall insulation.
      b. Encroaches on the required air gap.

C. Verify substrate and surface conditions are in accordance with flexible flashing manufacturer recommended tolerances prior to installation.
   1. Review requirements for sequencing of installation of flexible flashing assembly with installation of windows, doors, louvers and wall penetrations to provide a weathertight flashing assembly.
   2. Verify flexible flashing will be continuously supported by substrate, and not span any gaps or voids in excess of 1/2 inch.

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

3.2 PREPARATION

A. General
   1. If ice or snow has formed on masonry bed, remove by carefully applying heat until top surface is dry to the touch.
   2. Remove all masonry deemed frozen or damaged.

B. Protect existing membrane roofing system. No masonry work is to be performed over an unprotected roof.
   1. Loosely lay 1-inch minimum thick, molded expanded polystyrene (MEPS) insulation over the roofing membrane in areas indicated. Loosely lay 15/32-inch plywood or OSB panels over MEPS. Extend MEPS past edges of plywood or OSB panels a minimum of 1 inch.
      a. Protection sheet or mat: Provide a sacrificial layer of matching membrane sheet extending minimum 6 inches beyond insulation in all directions or a woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.
   2. Limit traffic and material storage to areas of roofing that have been protected.

C. Protect concrete floor from damage where floor will remain exposed.

D. Concrete Surfaces: Where masonry is to be placed, clean concrete of laitance, dust, dirt, oil, organic matter, or other foreign materials that would inhibit bond of mortar to the surface.

3.3 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
   1. Note: In lieu of double wythe foundation walls, single wythe matching nominal overall width of double wythe may be provided.

B. Build chases and recesses to accommodate items specified in this and other Sections. Provide not less than 8 inches of masonry between chases or recesses and jamb of openings, and between adjacent chases and recesses.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
   1. Consult other trades and make provisions to permit installation of their work in a manner to avoid cutting and patching. Build in work specified under other Sections, as necessary, and as work progresses.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
   1. When units are above 32 deg. F, heat water above 70 deg. F.
   2. When units are below 32 deg. F, heat water above 130 deg F.
   3. Recommended procedure to insure that brick are nearly saturated, surface dry when laid is to place a hose on the pile of brick until the water runs from the pile. This should be done one day before brick are to be used. In extremely warm weather, place hose on pile several hours before brick are to be used.

H. Do not wet concrete masonry units.

I. Cleaning Reinforcement: Before being placed, remove loose rust, ice, or other coatings from reinforcement.

3.4 TOLERANCES

A. General: Comply with construction tolerances in TMS 402/602 and the following:

B. Dimensions and Locations of Elements:
   1. For dimension in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
   4. If the above condition, cannot be meet due to previous construction, notify the A/E.

C. Lines and Levels
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet or 1/2 inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

D. Joints
1. Unless additional restrictions are indicated, horizontal mortar joints between masonry units shall be in the range of: 1/4 inch to 1/2 inch.
2. Vertical mortar joints between masonry units shall be in the range of: 1/8 inch to 3/4 inch.
3. For brick bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
4. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
6. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

E. Reinforcing Bars: Tolerances for placing reinforcing bars are:
1. Variation from *d* for flexural elements (measured from center of reinforcement to the extreme compressive face of masonry):
   a. $d \leq 8$ inch — $\pm$ 1/2 inch
   b. 8 inch < $d \leq 24$ inch — $\pm$ 1 inch
   c. $d > 24$ inch — $\pm$ 1-1/4 inch
2. For vertical bars in walls — 2 inch from the location along the length of the wall indicated on the project drawings.
3. In addition, a minimum clear distance between reinforcing bars and the adjacent face of a masonry unit of 1/4 inch for fine grout or 1/2 inch for coarse grout must be maintained so that grout can flow around the bars.

3.5 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
1. Do not install cracked, broken, or chipped masonry units exceeding ASTM allowances.
2. Clean units of surface dirt and contaminants before placing in contact with mortar.
3. Lay-up walls plumb and true and with courses level, accurately spaced, within specified tolerances, and coordinated with other work. Do not wedge partitions tight against structural ceiling or beams, but provide an acoustical joint between masonry and the structural roof deck, structural steel framing or structural floor deck at nonrated conditions. Refer to Division 07 Section “Acoustical Joint Sealants”. At rated walls, provide firestopping. Refer to Division 07 Section “Fire-Resistive Joint Systems.”
   a. Cut masonry as required to maintain 2 inches clearance between masonry and all steel or reinforced concrete structural members that pass through or above walls, but are not to be supported by the walls.
4. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors, unless otherwise indicated.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.
1. One-half running bond with vertical joint in each course centered on units in courses above and below, unless otherwise noted.

a. Lay center scored concrete masonry units with courses staggered so joints on alternate courses will appear at the midpoint of the 8 by 8 inch faces.

2. Provide 1/3 running bond, where indicated and with norman and utility size facing brick.
3. Provide special bonding as indicated on Drawings.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
1. Align unit cells or cores that are to be grouted.

D. Stopping and Resuming Work: Stop work at vertical control joints or by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
1. Stop off horizontal run of masonry by racking back 1/2 length of unit in each course.
2. Toothing is not permitted, except upon written acceptance of the A/E.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
1. Install adjustable hollow metal frame anchors, locating anchors on jambs in horizontal bed courses near the top and bottom of each frame and at intermediate points not over 24 inches apart.
2. Unless otherwise noted or thermal break is required, contractor may grout jambs of hollow metal door and window frames in accordance with ANSI 250.8.
   a. Where grout is installed during masonry installation, frames shall be braced or fastened in such a way that will prevent the pressure of the grout from deforming the frame members. Grout shall be mixed to provide a 4 inch maximum slump consistency, hand troweled into place. Grout mixed to a thin “pumpable” consistency shall not be used.
3. Rake joints around exterior side of exterior hollow metal door frames for sealant under Division 7.
4. Protect inside (concealed) faces of door frames in exterior masonry walls, using fibered asphalt emulsion coating. Apply over shop primer approximately 1/8 inch thick and allow to dry before handling.
5. Where hollow metal frames do not wrap around masonry jambs and heads, rub exposed corners of block to remove sharp, irregular edges.
6. Take particular care to embed all conduits and pipes with concrete masonry without fracturing exposed shells and to fit units around switch, receptacle and other boxes set in walls. Where electric conduits, outlets, switch boxes, and similar items occur, grind and cut units before building in services. Prepare cutouts in such a manner that units can be installed plumb and flush.
7. Install anchors, reglets, and nailers for flashing and related work built into masonry work, where indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a grout stop (a layer of metal lath, wire mesh, or plastic mesh) in the joint below and rod mortar or grout into core.

G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

H. Where non-loadbearing, full-height masonry walls intersect structural framing above, provide a minimum 1/2 inch clear joint around the member. Do not build masonry solid around open-web steel joists.
1. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section “Joint Firestopping”.
2. At non-fire-rated, but acoustically rated partitions treat joint between top of partition and underside of structure above to comply with Division 07 Section “Acoustical Joint Sealants”.

3.6 MORTAR BEDDING AND JOINTING

A. Mortar Bedding; Brick and Concrete Masonry Units as follows:
   1. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials that would impair the work. Each mortar batch is allowed only one retempering. Do not use mortar, which has begun to set after the first retempering, or if more than 2-1/2 hours has elapsed since initial mixing. Retempering will be permitted only within 1-1/2 hours of mixing, to replace moisture lost by evaporation. Discard any mortar or grout that is partially set.
   2. Lay brick and other solid masonry units with completely filled bed and head joints. Do not deeply furrow bed joints. Butter ends with sufficient mortar to fill head joints and shove into place. Butter ends of brick in hand and in the wall at closures. Do not slush head joints. Rock closures into place with head joints thrown against adjacent brick in place.
      a. Do not pound corners and jambs to fit stretcher units after they are set in position. Where an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar.
   3. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls, in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
      a. Construct bed joint of the starting course of foundation with a thickness not less than 1/4 inch and not more than 3/4 inch.
   4. Remove mortar protruding into cells or cavities that will be grouted. Do not permit mortar droppings to fall into cells, cavities of multi-wythe walls or to block weep holes. Maintain clear cavity width between facing and backing material and keep clear of mortar droppings by back beveling the mortar bed to prevent excess from extruding into cavity. Clean any excess that does occur by parging it to back of unit.
   5. Fill holes not specified in exposed and below grade masonry with mortar.

B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Allow cleaned surfaces to dry before setting.
   3. Wet joint surfaces thoroughly before applying mortar.
   4. Rake out mortar joints for pointing with sealant, where indicated.

C. Joints: Maintain joint widths shown, except for minor variations required, to maintain bond alignment. Lay walls with 3/8 inch joints. Tool joints consistently with the same type round jointer when the mortar is thumb print hard. Use a jointer that is slightly larger than the joint width so that complete contact is made along the edges of the unit. Tool joints in exposed masonry walls at uniform moisture content to avoid color variations. Perform tooling so that the mortar is compressed and the joint surface is sealed. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials. For exposed masonry, provide joints as follows:
   1. Exterior Joints
      a. Concave tooled, unless otherwise noted.
         1) For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.
      b. Provide tooled joints horizontal and vertical at scored concrete masonry units, including score joint.
   2. Interior (Room Side) Joints
      a. Concave tooled, unless otherwise noted.
   3. Cavity Wall (Exterior Side of Inner Wythe) Joints: Cut joints flush for masonry walls to receive air barrier.

3.7 MULTIWYTHE (COMPOSITE) MASONRY, GENERAL

A. Bond wythes of multiwythe masonry (non-composite) together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
    a. Where bed joints of wythes do not align or when wythes are not laid at the same time, use adjustable (two-piece) type ties.
2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.

B. Corners: Provide interlocking masonry units bond in each wythe and course at corners, unless otherwise indicated.
1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond wall together as follows:
1. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
    a. Where indicated, provide individual metal ties not more than 16 inches o.c.
    b. Where indicated, provide rigid metal anchors not more than 48 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.8 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:
1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
    a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
    b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type ties to allow for differential movement regardless of whether bed joints align.
2. Masonry Joint Reinforcement: Provide unless otherwise noted. Install in horizontal mortar joints.
    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes, if both wythes are concrete masonry and installed simultaneously. At no time shall a wythe be more than 16 inches higher than any other wythe being constructed concurrently.
    b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
    c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align. Wythes may be laid up full height separate from facing wythe.
        1) Cavity width changes shall be accommodated by different sized wire ties; wire ties should not be bent or deformed to span the cavity space.
3. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

1. Keep cavity clean of mortar droppings by suspending by wires a wooden strip the width of the air space. Strip shall be lifted as each course of joint reinforcement is laid in facing wythe. Install cavity mortar protection in cavity above through wall flashing and where indicated for additional protection.

C. Apply air barrier to face of backup wythe to comply with Division 07 “Air Barrier” sections.

D. Installing Cavity-Wall Insulation: Place vertical strips of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry or butter all edges of insulation board with adhesive or seal gaps with tape as recommended by insulation board manufacturer to provide a continuous weather/thermal barrier.

3.9 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
1. Space reinforcement not more than 16 inches o.c., unless otherwise noted.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
   a. Reinforcement above is in addition to continuous reinforcement.
4. Provide reinforcement in every other course of concrete masonry veneer, but not in the same course as the tie.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing [concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Fasten screw-attached anchors through sheathing to wall framing and [to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Fasten channel slots to concrete or existing masonry backup with metal fasteners of type and in quantity indicated (but not less than three per unit length).
3. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and exterior face of inner wythe or sheathing.

4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.
6. Masonry veneer anchors shall be embedded a minimum of 1-1/2 inches into the mortar joint. Provide a minimum of 5/8 inch mortar coverage at veneer to the outside face.

B. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing or insulation.
1. Keep air space clean of mortar droppings and other materials during construction. Bevel beds away from air space, to minimize mortar protrusions into air space. Do not attempt to trowel or remove mortar fins protruding into air space.

3.12 CONTROL AND EXPANSION JOINTS (MOVEMENT JOINTS)

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Other than bond beams do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
1. Install an elastomeric tubing sealant backer rod at each control joint to compartmentalize masonry cavity.
2. Reinforcing and grout for masonry bond beams are to run continuous through vertical control joints.
3. Keep joints clean from all mortar and debris.

B. Form control joints in concrete masonry using one of the following methods:
1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick made from clay or shale as follows:
1. Build in compressible joint fillers, unless otherwise noted.

D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

E. Control Joint Locations in CMU: Provide vertical control joints in reinforced CMU where called for on the Drawings. Provide vertical control joints in unreinforced CMU in accordance with NCMA TEK Bulletins 10-01A, 10-02D, 10-03, and 10-04, and at all offsets, returns, openings, and intersections with dissimilar materials and as follows to prevent cracking:
1. At change from wall setting on foundation to wall setting on floor slab.
2. At change from exterior wall to interior wall.
3. At walls setting on floors that cross floor construction.
4. At columns within masonry walls.
5. At changes in wall thickness.
6. Stop joint reinforcement bars on either side of control joints. Extend reinforcing bars in bond beams continuously through control joints and sleeves for bond break 18 inches each side of joint.
7. Install control joints in concrete masonry units with prefabricated shear key.
8. At end of lintel bearing on one end of openings less than or equal to 6'-4" and at both ends of openings greater than 6'-4".

9. Straight runs as indicated below, with spacing related to wall height as follows:
    a. Walls less than 8 feet: Not more than 3 times wall height.
    b. Walls 8 feet or higher: Maximum 25 feet.
10. Distance between joints should not exceed the lesser of the following:
    a. A length-to-height ratio of 3 to 2.
    b. 25 feet.

F. Expansion Joint Locations in Brick: Provide in accordance with BIA Technical Note No. 18A at vertical expansion joints in brick masonry at all offsets, returns, openings, intersections with dissimilar materials, and elsewhere as shown on Drawings and indicated hereinafter. For brick work without openings, space no more than 25 feet o.c.
1. Place as follows:
    a. At or near corners
    b. At offsets and setbacks
    c. At wall intersections
    d. At changes in wall height
    e. Where wall backing system changes
    f. Where support of brick veneer changes
    g. Where wall function or climatic exposure changes
    h. At one jamb of openings 12 feet or wider.
2. Form open joint of width indicated but not less than 3/8 inch for installation of preformed expansion joint filler, and sealant and backer rod specified in Division 07 Section “Joint Sealants”. Maintain joint free and clear of mortar.

G. Building Expansion Joint Through Masonry
1. Form open joint of width indicated but not less than 3/8 inch for installation of preformed expansion joint filler, and sealant and backer rod specified in Division 07 Section “Preformed Joint Seals”. Maintain joint free and clear of mortar.
2. For expansion joints 2 inches and greater, refer to Division 07 Section “Expansion Control”.

3.13 LINTELS

A. Install loose steel lintels furnished under Division 05.
1. Shore steel lintels until the masonry has attained sufficient strength to carry its own weight. Limit the deflection of masonry during this period to L/600 or 0.3 inch (whichever is less). This shoring period should not be less than 24 hour. This minimum time period should be increased to three days when there are imposed loads to be supported. If the masonry is built in cold weather construction conditions, the length of cure should be increased.

B. Provide masonry lintels where shown and wherever openings of more than 8 inches for brick size units and 16 inches for block size units are shown without structural steel or other supporting lintels. Provide prefabricated or formed-in-place masonry lintels. Thoroughly cure prefabricated lintels before handling and installation. Temporarily support formed-in place lintels.
1. For hollow masonry lintels, use specially formed "U"-shaped lintel units with solid bottom and reinforcing bars placed as shown, and filled with coarse grout. Bond beam block shall not be used to form masonry lintels.
2. Bond pattern for masonry lintels shall match the pattern at the adjacent wall unless otherwise noted.

C. Provide minimum 8 inch solid bearing at each end, unless otherwise noted. Provide solid masonry units or hollow units filled solid.
1. Provide a slip plane in the form of flashing or other bond breaker between the lintel and masonry in unreinforced CMU walls.

D. For steel lintels in exterior wythe, rake back mortar in preparation for sealant as specified in Division 07 Section “Joint Sealants”.

E. Where formed-in-place masonry lintels are supported by steel angles over the opening during installation, the angles shall not extend more than 2-1/2 inches into the masonry on each jamb of the opening. When the angles are removed, the void remaining shall be packed tightly with a moist mixture of Type S mortar.

F. The reinforced masonry and lintel drawings are intended to show the major lintels required for windows, doors, louvers, and other major openings. Some lintels are shown for some mechanical duct and pipe openings, but the drawings are not intended to show all of these openings. The masonry contractor shall coordinate the size and location of openings required in masonry walls by the other contractors and provide steel or masonry lintels for these openings according to the lintel schedules in the Contract Documents whether shown on the Contract Documents or not.

3.14 FLASHING, WEEPS, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep vents in first course of masonry above ground level, at shelf angles, lintels, ledges, above doors, windows and other openings and under coping and sills, other obstructions to downward flow of water in wall. Flashing shall be installed longitudinally continuous or terminated with end dams. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities. Comply with NCMA recommendations for "drainage wall system" masonry construction.
   1. Install concealed through wall flashing in accordance with SMACNA "Architectural Sheet Metal Manual" Chapter 4 Flashing and with NCMA TEK Bulletins 19-04A and 19-05A details to ensure water resistant masonry construction.
   2. Apply primer, if required by manufacturer according to manufacturer's written instructions.
   3. Install preformed corners and end dams, cants, if required, under flexible flashing membrane, bedded in sealant in appropriate locations along wall.
   4. Starting at a corner, remove release sheet, if applicable, and apply membrane to primed, if required by manufacturer for substrate indicated.
   5. Extend membrane through wall and leave 1/4 inch minimum exposed.
   6. Roll flashing into place. Ensure continuous and direct contact with substrate. Avoid trapping air and forming wrinkles.
   7. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.
   8. Trim exterior edge of flexible flashing membrane 3/4 inch and secure to metal drip edge per manufacturers written instructions, where drip edge is required.
      a. Embedded flashing materials shall not be used for drip edges.
   9. Terminate flexible flashing membrane on vertical wall with a termination bar.
   10. Apply sealant bead at each termination.
   11. Protect installed flexible flashing from damage during construction.
      a. Inspect before covering and make repairs as necessary. Remove and replace damaged material. Repair holes and tears by covering with cut patch of similar product overlapping damage 2 inches minimum. Seal perimeter of patch repair with sealant/mastic.
      b. Cover flexible flashing as soon as possible after installation has been observed and tested. Do not expose longer than 60 days, unless otherwise approved by membrane manufacturer in writing.

B. Install flashing as follows, unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
      a. Install proprietary flashing/drainage system in accordance with manufacturer's installation instructions.

2. At multiwythe masonry walls, including cavity walls, where wall intersects a roof or similar horizontal element, extend flashing through outer wythe, turn up 16 inches or a minimum of 6 inches above cavity mortar protection, and terminate on exterior face of inner wythe with termination bar and sealant. Install metal reglet/receiver, extending through cavity and turned up at exterior face of inner wythe, beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal reglet/receiver.
    a. Note: Embedded flashing must terminate a minimum of 12 inches above roofing surface. Coordinate termination with roofing contractor.
3. At multiwythe masonry walls, including cavity walls, where wall intersects grade, extend flashing through outer wythe, turn up 16 inches or a minimum of 6 inches above cavity mortar protection, and terminate on exterior face of inner wythe with termination bar and sealant. Cut flexible flashing off flush at face of wall after masonry wall construction in completed.
4. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 16 inches or a minimum of 6 inches above cavity mortar protection, and terminate with a termination bar and sealant. Terminate flashing at outer wythe using the same methods used at multiwythe masonry walls as specified hereinbefore.
5. At lintels and shelf angles, extend flashing over top flange of angle across air space behind veneer and turn up a 16 inches or a minimum of 6 inches above cavity mortar protection, and terminate on exterior face of inner wythe or sheathing with termination bar and sealant. At outer wythe extend flashing at least 6 inches beyond end of lintel or shelf angle and turn up ends not less than 2 inches to form end dams. Install metal drip edges beneath flexible flashing at exterior face of wall and seal with sealant to lintel or shelf angle. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
    a. Where the lintel or shelf angle is bolt-mounted in place, cut-off excess bolt length at face of nut prior to installing the flexible flashing. After positioning the flexible flashing, cut a small “X” in the flashing to allow the flashing to fit over the nut and then apply compatible mastic to the flashing a minimum of 1 inch out from the “X” in all directions.

C. Install weep vents in head joints in exterior wythes of first course of masonry immediately above embedded flashing (not mortar) and as follows:
    1. Use specified weep/vent products to form weeps.
    2. Space weep vents 16 inches o.c., unless otherwise indicated.
    3. Keep weep holes and area above flashing free of mortar droppings.

D. Place cavity mortar protection material in cavities to comply with configuration requirements for cavity mortar protection material in Part 2 "Miscellaneous Masonry Accessories" Article.
    1. Option: Use geotextile drainage fabric as recommended by flashing manufacturer, and install to have the fabric reach the base of the flashing and covering the weep vents.
        a. Inspect flashing for holes prior to installing fabric mesh. Coordinate repair of holes with installer of flashing.
        b. Place a continuous row of fabric mesh one inch into the mortar joint of the third row of standard size exterior bricks in collar joints, cavity walls, or lintels. Drape excess material onto base of flashing. Ensure that flashing is clean of mortar droppings and debris. Adhesives and fasteners are not required; mortar need not have set.
        c. If excessive droppings are expected, use a taller height fabric mesh and taller flashing.
        d. Cut or tear to accommodate wall ties, conduit, plumbing or other materials that bridge or intrude into cavity between inner and outer walls.

E. Install vents in head joints in exterior wythes at 32 inches o.c., unless otherwise indicated. Use specified weep/vent products to form vents.
    1. Close cavities off vertically with elastomeric tube sealant back rod in manner indicated. Install through-wall flashing and weep vents above horizontal blocking.

3.15 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 402/602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. The low-lift grouting procedure shall be used as described in the Drawings and in NCMA-TEK 03-02A Grouting Concrete Masonry Walls.
      a. High-Lift Grouting: Do not use unless approved by A/E. If high-lift grouting is approved, limit lifts to 12'-0" and use super plasticizer in grout to reduce water content.
   3. Grout (slump 8 to 10 inches) shall be installed in the block cavities so as to completely fill each cavity with homogenous grout, extending from the lowest course to the top of the reinforced portion of the foundation or wall. Concrete or mortar shall not be used as grout for CMU.
   4. Between 5 and 20 minutes after the grout is placed, it shall be consolidated with a mechanical vibrator. The top of the grout filling shall be stopped 1-1/2 inches below the top of the concrete block to form a key, except for the top course in the wall where the grout shall be struck flush with the top.
   5. Aggregate used in the grout shall be small enough not to interfere with placement and plasticity.
   6. Caging devices and centering clips shall be spaced vertically such that 2 clips or devices, one near its top and one near its bottom restrain every section of vertical reinforcing bar.
   7. Where grouted cores do not extend the full height of a wall, install grout stop mesh at the lower limit of the grout.
   8. Where required on the plans, grouting operations shall be observed by an independent testing agency.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage qualified independent inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections. Minimum qualifications for the masonry inspector shall be 5 years of reinforced masonry inspection experience or acceptance by a State, municipality, or other governmental body having a program of examining and certifying inspectors for reinforced masonry construction. The masonry inspector shall be present during sampling and placing of masonry units, placement of reinforcement, inspection of grout space immediately prior to closing of cleanouts, and during grouting operations. The masonry inspector shall assure Contractor compliance with drawings and specifications, including flashing. The masonry inspector shall keep a complete record of all inspections and shall submit Masonry Inspection Reports and Special Inspection requirements set forth in the structural drawings for inspection requirements and a photographic documentation of flashing.
   1. Masonry Inspection: Provide masonry construction inspection of concrete or brick masonry walls indicated as requiring inspection on the Masonry Plans to insure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements that must be constructed to attain high design strengths.
      a. Inspection shall use NCMA-TEK 18-03B "Concrete Masonry Inspection" as a guideline.

b. The individual or individuals who will perform the masonry inspection shall be present for the Preliminary Masonry Meeting.
c. The masonry inspector shall prepare a written report or reports for each day of inspection. Masonry Inspection Report, following this Section, shall be used for all inspection reports. Inspecting reports shall be submitted to the A/E within 5 days of masonry inspection.
d. The masonry inspector shall be present and observe all masonry construction operations in walls requiring inspection. The masonry inspector shall be present at the Project site within sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Level B special inspection according to the "TMS 402," unless otherwise noted.
1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grouts only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq.ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140 for compressive strength.
1. Tests of Concrete Masonry Prisms: The Masonry Contractor shall coordinate with a qualified testing laboratory to perform field quality control testing during the masonry work.
a. When required by the Masonry Plan, construct a set of 3 masonry prisms using mortar and concrete masonry units to be used in the masonry work. Unless otherwise noted, construct prisms 8 inches by 8 inches by 16 inches high (nominal).
b. When prism tests are required to establish the strength of masonry in lieu of Masonry Inspection, provide a minimum of one set of 3 masonry prisms for testing for each 5000 sq.ft. (gross) of masonry wall construction.
c. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, name of material suppliers, specific location where masonry represented by the prism is used, compression test strength results, and specified required strength.
d. If the compressive strength tests fail to meet the minimum strength specified in the Plans, the masonry represented by the tests shall be considered deficient.
e. When tests indicating deficient masonry represent masonry already constructed, such masonry shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the A/E without additional cost to the Owner.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.
1. Tests for Mortar: The Masonry Contractor shall coordinate with a qualified testing laboratory to perform field quality control testing during the masonry mortar work.
a. For colored and noncolored mortars test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.

1) Provide a minimum of six cubes for testing per 5,000 sq.ft. of masonry wall construction and as directed by A/E. Test two cubes at 7 days, two cubes at 28 days, and reserve two cubes for future testing.

b. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate material is acceptable for intended use.

c. If the compressive strength tests fail to meet the minimum requirements specified; the mortar represented by such tests would be considered deficient in strength.

d. Deficient mortar shall be removed and replaced by the Contractor without additional cost to the Owner.

H. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

1. Place a piece of preservative-treated wood 1-5/8 inch thick and 3 inch square on a level surface. For masonry units with permeable paper, such as absorptive paper toweling, taped to one face shell are placed around the wood block to form the mold. The resulting mold is approximately 3 inches square by 6 inches high. Measure and record the slump of the grout in accordance with Test Method C143. Pour grout into the mold in two layers. Rod each layer 15 times with a tamping rod to eliminate air bubbles. Rod the bottom layer throughout its depth. Distribute the strokes uniformly over the cross-section of the mold. For the upper layer, allow the stick to penetrate about 1/2 inch into the underlying layer. After the second lift is puddled, level the top of the specimen with a straightedge and immediately cover the specimens with wet burlap or similar material to keep it damp. Protect the specimens against disturbance and extreme changes in temperature, and after 48 hours, remove the masonry units and carefully pack the specimens for transport to the laboratory where they will be stored in a moist room until tested.
2. Cap the specimens in accordance with the applicable provisions of "Method of Capping Cylindrical Concrete Specimens," ASTM C617. The specimens shall be tested in a damp condition in accordance with the applicable provisions of ASTM C39 "Methods of Test for Compressive Strength of Molded Concrete Cylinders."
3. Four test specimens shall be made and tested for each type of grout to be used in the work.
4. As an alternate to the method of sampling described above, grout samples may be formed in grout sample boxes, when requested and approved by A/E.
5. Tests for Grout: The Masonry Contractor shall coordinate with a qualified testing laboratory to perform field quality control testing during the masonry grout work.
   a. Grout for filling reinforced or unreinforced concrete masonry cores or brick cavities: Test for compressive strength.
      1) Provide a minimum of 4 test specimens for testing per 5,000 sq.ft. of masonry wall construction or for each ready mix truckload of grout and as directed by the A/E. Test one cylinder at 7 days, two cylinders at 28 days, and reserve one cylinder for future testing.
   b. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, specific location where material represented by sample is used, slump and compression test results. Indicate whether material is acceptable for intended use.

3.17 REPAIRING, POINTING, AND CLEANING

A. Cleaning, General

1. Know your surface. Positively identify every substrate to be cleaned. Review all manufacturers literature for cleaning recommendations.
2. Always test before overall cleaning. Always test, and always clean under the same conditions you tested under. Retest if conditions change.
3. Use the mildest cleaner and dilution that still gives effective results.

4. Clean early:
    a. Don't give mortar smears and films a chance to become as hard as the masonry. Get if off while it's still relatively soft. Clean masonry within 7 to 21 days of installation.
    b. Clay brick maybe cleaned within 14 to 28 days.
5. Use the right cleaner for the right job. Follow the masonry manufacturer's guidelines for cleaning each type of masonry.
6. Never clean with raw acid.
7. Cleaning basics
    a. Don't spare the water. Pre-wetting masonry is recommended. Rise with 400 psi to remove stains and cleaner residue.
    b. Clean bottom-to-top, and always keep lower areas wet to prevent streaking.
    c. Follow all safety precautions in the product literature.
    d. Cold weather
        1) Water-saturated masonry is vulnerable to freeze/thaw damage. Never clean if the masonry could freeze before drying.
        2) Chemical cleaners and rinse water rely on chemical reactions to dissolve and rinse away construction soiling. Cold temperatures slow these chemical reactions. Compensating for the cold by using a stronger cleaning solution may cause permanent damage to the masonry, especially colored concrete.
            a) Instead, extend the dwelling time of the properly diluted cleaning solution by 10-20 percent. Scrub areas of heavy soiling with a masonry washing brush. Pre-wetting and rinsing with hot water warms surface and improves results.
        3) Schedule wet cleaning for when air and surface temperatures are 40 deg. F. and rising. In cold weather this means your wet-cleaning window may be only a few hours. Use the time before and after to dry-brush and scrape away heavy accumulations of excess mortar and job dirt from the next day's work area.
        4) If a limited cleaning window is impractical, enclose the work area with polyethylene and use approved heaters to warm masonry.
        5) Warm weather test panels won't work for cold weather cleaning. Test in cold clean in cold.

B. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
    1. Provide a 100 square foot area of patched CMU for A/E's review. Do not proceed with patching until area is approved. Wall shall appear uniform from a distance of 5 feet. If masonry units are colored, coordinate blend with unit manufacturer.

C. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
    1. Tuckpointing
        a. Rake mortar joints to a depth of not less than 1/2 inch nor more than 3/4 inch.
        b. Saturate joints with clean water.
        c. Fill solidly with pointing mortar.
        d. Tool joints.

D. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints. Dry brush exposed masonry with bristle brushes at end of each work day.
    1. Promptly remove excess wet mortar containing integral water-repellent mortar admixture from the face of the masonry as work progresses. Do not use strong acids, over-aggressive sandblasting or high-pressure cleaning.

E. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
    1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes or use methods used on approved mock-up. Obtain A/E's approval of sample cleaning before proceeding with cleaning of masonry.
   a. Where walls are a combination of CMU and brick only the less aggressive CMU cleaners shall be used.
   b. Comply with applicable environment laws and restrictions.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
   a. Remove efflorescence in accordance with brick manufacturer's recommendations. Cleaning agents may be used only with approval of masonry unit manufacturer. Cleaning agents must be same as those used on test area.
   b. If chemical cleaners are to be sprayed on, the pressure shall not exceed 50 psi.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 08-02A and 08-03A, applicable to type of stain on exposed surfaces.
   a. If additional cleaning is necessary for special CMU, consult with masonry unit manufacturer for approved method. Test method and gain A/E approval before proceeding.
   b. Water application method shall never exceed 400 psi without approval of A/E.
8. Clean stone trim to comply with stone supplier's written instructions.

3.18 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

3.19 LIST OF SPECIAL INSPECTIONS

TABLE 1.19.2 (TMS 402-11)

LEVEL B QUALITY ASSURANCE

VERIFICATION AND INSPECTION	Frequency		Reference for Criteria	
	CONTINUOUS	PERIODIC	TMS 402	TMS 602
1. Verification of slump flow and VSI as delivered to the site for self-consolidating grout.	X	--	--	Art. 1.5 B.1.b.3
2. Verification of f'_m prior to construction except where specifically exempted by this code.	--	X	--	Art. 1.4 B
3. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	---	X	---	Art. 1.5
4. As masonry construction begins, the following shall be verified to ensure compliance:				
a. Proportions of site-prepared mortar.	--	X	--	Art. 2.1, 2.6 A
b. Construction of mortar joints.	--	X	--	Art. 3.3 B
c. Location of reinforcement and connectors.	--	X	--	Art. 3.4

5. During construction the inspection program shall verify:				
a. Size and location of structural elements.	--	X	--	Art. 3.3 F
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	--	X	Sec. 1.16.4.3, 1.17.1	--
c. Welding of reinforcement.	X	--	Sec. 2.1.8.7.2, 3.3.3.4(c)	--
d. Preparation, construction and protection of masonry during cold weather (temperature below 40 deg. F) or hot weather (temperature above 90 deg F.)	--	X	--	Art. 1.8 C, 1.8 D
e. Placement of grout is in compliance	X	--	--	Art. 3.5
6. Prior to grouting, the following shall be verified to ensure compliance.				
a. Grout space.	--	X	--	Art. 3.2 D, 3.2 F
b. Grade, type, and size of reinforcement and anchor bolts.	--	X	Sec. 1.16	Art. 2.4, 3.4
c. Placement of reinforcement and connectors.	--	X	Sec. 1.16	Art. 3.4
d. Proportions of site-prepared grout.	--	X	--	Art. 2.6 B
e. Construction of mortar joints.	--	X	--	Art. 3.3 B
7. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	--	X	--	Art. 1.4

a.

END OF SECTION 04 20 00.00

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Steel pipe and tube railings.

B. Mark furnished but installed under other Sections:
   1. Furnish sleeves and anchors to be cast in concrete to Division 03 Section “Cast-in-Place Concrete”.

C. Related Sections include the following:
   1. Division 05 Section "Metal Fabrications" for additional requirements for chemical anchors.
   2. Division 05 Section "Metal Stairs".
   3. Division 06 Section "Rough Carpentry" for wood blocking for anchoring railings.
   4. Division 09 Section "Gypsum Board Assemblies" for metal backing for anchoring railings.
   5. Division 09 painting sections for:
      a. Primer and finish painting.
      b. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint.

1.3 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Manufacturer's product lines of mechanically connected railings.
   2. Grout, anchoring cement, and paint products.
   3. Railing brackets.
   4. Welding certificates.
   5. Qualification Data: For professional engineer.

B. Shop Drawings: For all railing systems, including:
   1. Splices and attachments.
   2. Identify location of all railing systems.
   3. Indicate railing systems in related and dimensional position, with elevations at scale of 1/4 inch equals 12 inches and details at scale of 3 inch equals 12 inch (1:5) or larger.
   4. Show all details and dimensions not governed by field conditions.
   5. Indicate all required field measurements.

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

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."

B. Engineer Qualifications: Professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated for handrails and railing systems similar to this Project in material, design, and extent, and that have a record of successful in-service performance.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
   2. Provide allowance for trimming and fitting at site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.

C. Storage on Site
   1. Store material in a location and in a manner to avoid damage. Stacking shall be done in a way which will prevent bending.
   2. Store aluminum, bronze, and stainless steel components and materials in a clean, dry location, away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin or polyethylene sheeting in a manner that will permit circulation of air inside the covering.

D. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of materials.
   1. Refer to NAAMM Manual AMP 555-92, Code of Standard Practice for the Architectural Metal Industry, Sections 6 and 7.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect/Engineer’s approval must be accompanied by the “Substitution Request Form” and complete technical data for evaluation. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, posts, and attachments to adjoining construction, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings and posts to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
   1. Steel: 72 percent of minimum yield strength.

C. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
      b. Infill load and other loads need not be assumed to act concurrently.

D. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
   1. Provide bracket that provides 1-1/2 inch clearance from inside face of handrail to finished wall surface.

2.4 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
   1. Provide hot dipped galvanized finish where indicated, pool equipment room.
   2. Where required by delegated design requirements, provide increased weight pipe.

C. Plates, Shapes, and Bars: ASTM A 36.

D. Castings: Either gray or malleable iron, unless otherwise indicated.
   1. Gray Iron: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.
   2. Malleable Iron: ASTM A 47.

2.5 FASTENERS

A. General: Provide the following:
   1. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
   2. Hot-Dip Galvanized Railings: Type 316L stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153 or ASTM F2329 for zinc coating.
   3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:
   1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

D. Post-Installed Anchors: Provide chemical, anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
   1. Refer to Division 05 Section "Metal Fabrications."

E. Brackets, Flanges, Fittings and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of handrails and guards to other work. Furnish inserts and other anchorage devices for connecting handrails and guards to concrete and masonry work.
   1. Wall Bracket: Cast ductile iron wall mount handrail bracket with a projection of 2-1/2 inch. Bracket shall have one 7/16 inch mounting hole, 1-1/2 inch drop and round saddle with two countersunk mounting holes.
      a. Manufacturers
         1) Julius Blum & Co.
         2) R&B Wagner, Inc.
         3) J.G. Braun Co.
   2. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket of fitting rotation and crushing of substrate.
   3. Ease corners and edges of brackets. Brackets shall not have sharp edges.

2.6 MISCELLANEOUS MATERIALS

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

B. Etching Cleaner for Galvanized Material; Complying with MPI #25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79 and compatible with topcoat.
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

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

G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   1. Water-Resistant Product: Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces equally spaced per code requirements between top rail and finish floor or nosing line of tread.
   1. Locate intermediate rails.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Connections: Fabricate railings with either welded or nonwelded connections, unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      a. Do not weld aluminum.
   2. Obtain fusion without undercut or overlap.
   3. Remove flux immediately.
   4. Weld exposed corners and seams continuously, unless otherwise indicated.
   5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds; completely sanded joint, some undercutting and pinholes okay.

H. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
   1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

I. Form changes in direction as follows:
   1. By bending or by inserting prefabricated elbow fittings.

J. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings or by welding metal closure in place.

L. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.
1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

N. For removable railing posts, fabricate slip-fit sockets from steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
2. At galvanized railings in pool equipment room, provide stainless steel sockets and stainless steel chain.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 STEEL AND IRON FINISHES

A. Galvanized Railings:
1. Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.
2. Comply with ASTM A 123 for hot-dip galvanized railings.
3. Comply with ASTM A 153 for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
6. Location: Pool equipment room only.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed railings:
   1. Other Railings: SSPC-SP3, "Power Tool Cleaning."

E. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
   1. Do not apply primer to galvanized surfaces.
   2. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
   1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
   2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
   3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Corrosion Protection: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
   1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches of post.
   1. Steel: Provide expansion joints on straight runs exceeding 40 feet.

3.4 ANCHORING POSTS

A. Tolerance: Set posts plumb and aligned to within 1/4 inch in 12 feet.

B. Setting Posts, General:
   1. Clean dust and foreign matter from sleeves/holes.
   2. Moisten interior of holes and surrounding surfaces with clean water.
   3. Prepare and use grout in accordance with manufacturer's directions.
   4. Place posts in position and brace until grout sets.
   5. Pour mixture into annular space until it overflows the hole.
   6. Wipe off excess and leave 1/8 inch build-up sloped away from post.

C. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
   1. Interior Locations: Use either nonshrink nonmetallic grout or anchoring cement.

D. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch buildup, sloped away from post.

E. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ANCHORING RAILING ENDS

A. Tolerances: Set rails horizontal or parallel to rake of steps or ramp to within 1/4 inch in 12 feet.

B. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

C. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.

3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
   1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
   2. Use type of bracket with predrilled hole for exposed bolt anchorage.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
   1. Steel Pipes: Spacing shall not be more than 6 feet.

C. Secure wall brackets to building construction as follows:
   1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
   2. For hollow masonry anchorage, use toggle bolts.
   3. For steel-framed gypsum board partitions, fasten brackets either directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads or with toggle bolts installed through flanges of steel framing or through concealed steel reinforcements or use hanger or lag bolts set into fire-retardant-treated wood backing between studs.

3.7 ADJUSTING AND CLEANING

A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.
   1. Do not use acid solution, steel wood or other harsh abrasives.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 13

SECTION 06 61 16 - SOLID SURFACE FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Solid Surface Fabrications (SSM) including, but not limited to the following:
   1. Window sills.
   2. Wall caps/fascia and trim.
   3. Bench Assembly (locker rooms & existing pool)

1.3 REFERENCES

A. Applicable Standards: Standards of the following, as referenced herein:
   1. American National Standards Institute (ANSI)
   2. American Society for Testing and Materials (ASTM)
   3. National Electrical Manufacturers Association (NEMA)

1.4 ACTION SUBMITTALS

A. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements. Clearly indicate manufacturer and compliance with standards.
   1. Flammability test reports.
   2. NSF/ANSI Standard 51 for food zone – all food types.

B. Shop Drawings: Indicate dimensions, component sizes, fabrication details, and attachment provision and coordination requirements with adjacent work.
   1. Show full-size details, edge details, thermoforming requirements, attachments, etc.
   2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
   3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

C. Samples for Verification: Submit minimum 2 inch by 2-inch samples. Indicate full range of potential variation in color and pattern. Approved samples will be retained as standards for work.

1.5 CLOSEOUT SUBMITTALS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals.
   1. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.
   2. Warranty: Special warranty as specified in this Section.

1.6 QUALITY ASSURANCE

A. Allowable tolerance:
   1. Variation in component size: +/- 1/8 inch.
   2. Location of openings: +/- 1/8 inch from indicated location.

B. Physical Performance Characteristics
   1. Flammability Test (flame spread and smoke developed)
      a. Test Procedure: NFPA 255 or UL 723.
      b. Rating: Class A.
   2. Food Zone Use
      a. Test Procedure: NSF 51.
      b. Rating: Pass

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery no components to the project site until areas are ready for installation. Store components indoors prior to installation.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.8 WARRANTY

A. Provide manufacturer's warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

B. Manufacturer's Warranty Period: Ten (10) years from date of Substantial Completion.

C. Special Warranty – Bench Assembly: Manufacturer's standard form in which manufacturer agrees to repair or replace solid-surface components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOLID POLYMER FABRICATIONS

A. Manufacturers: Subject to compliance with requirements, provide one of the following:
   1. ABA Industries
   2. Avonite, Inc.
   3. E.I. du Pont de Nemours and Company.
   4. Formica Corp.
   5. LG Chemical, Ltd.
   6. Meganite Inc.; a division of the Pyrochem Group.
   7. Samsung Chemicals (USA), Inc.; Cheil Industries Inc.
   8. Swan Corporation (The).
   9. Transolid, Inc.
   10. Wilsonart International; Div. of Premark International, Inc.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 MATERIALS

A. Material: Homogeneous solid sheets of filled acrylic resin complying with ANSI Z124.3 or ANSI Z124.6.
   1. Superficial damage to a depth of 0.010 inches shall be repairable by sanding and polishing.

2. Window sills/Wall Caps/Fascia: (SSF) 3/4 inch thick, adhesively joined with inconspicuous seams; edge details as indicated on the A/E's Drawings.
   a. Color: Refer to "List of Finishes".

2.3 ACCESSORY PRODUCTS

A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.

B. Sealant: Manufacturer's standard mildew-resistant, NSF 51 - compliant silicone sealant in color matching or clear formulations.

2.4 FABRICATION

A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with final shop drawings and manufacturers requirements.

B. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 2 inch wide reinforcing strip under each joint.

C. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

D. Finish: All surfaces shall have uniform finish.
   1. Matte, with a gloss rating of 5 - 20.

2.5 BENCH ASSEMBLY

A. Locations: Locker Room bench at lockers and wall mounted bench within existing Natatorium space.

B. Engineered and designed solid surface fabrication with integrated structural support for the solid surface as designed by Futrus Solutions, Mansfield, Ohio.
   1. Local Representative: Deco Associates, Indianapolis, Indiana.

C. Material: Homogeneous solid sheets of filled acrylic resin complying with ANSI Z124.3 or ANSI Z124.6.
   1. Manufacturers, as specified in Article 2.1, A.

D. Frame Materials: Corrosion resistant aluminum in size, shape, thickness and strength determined by fabricator to meet loading and assembly requirements.

E. Fabrication: Take into account expansion and contraction of frame and surface materials.
   1. Material thickness: 1/2 inch thick.
   2. Provide horizontal surfaces, vertical surfaces, ends, all in same thickness.
   3. All fasteners and fastening methods shall be concealed.
   4. Anchor frame material to existing substrate materials or new construction. All anchors and fastening materials shall be concealed. There are no other materials being provided by others.
   5. Assembly shall support loading typical for seated and standing persons.
   6. Fasteners: All fasteners shall be corrosion resistant aluminum or stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which solid surfacing will be installed.

B. Coordinate with responsible entity to correct unsatisfactory conditions.

C. Commencement of work by installer is acceptance of substrate conditions.

3.2 INSTALLATION

A. Install components plumb and level, in accordance with final shop drawings and product installation details.
   1. Provide product in the largest pieces available.
   2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
      a. Exposed joints/seams shall not be allowed.
   3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the scam with the strip being the same thickness as the top.
   4. Cut and finish component edges with clean, sharp returns.
   5. Route radii and contours to template.
   6. Anchor securely to base cabinets or other supports.
   7. Align adjacent tops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
   8. Carefully dress joints smooth, remove surface scratches and clean entire surface.

B. Provide backsplashes and endsplashes as indicated on the drawings.

C. Keep components and hands clean during installation. Remove adhesives, sealants and other stains.

D. Install bench assembly onto existing substrate materials and new construction per manufacturers/fabricators written installation instructions.

3.3 REPAIR/CLEANING/PROTECTION

A. Repair minor imperfections and cracked seams and replace sections of severely damaged surfaces in accordance with manufacturer's recommendations.

B. Clean surfaces in accordance with manufacturer's instructions.

C. Cover horizontal surfaces with heavy paper or cardboard to protect from damage until date of Substantial Completion or acceptance by Owner.

END OF SECTION 06 61 16

SECTION 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Adhered thermoplastic membrane roofing system.
      a. Low slope, steep/vaulted slope, and curved vaulted.
      b. Snow guards
   2. Substrate board.
   3. Vapor retarder/Barrier.
   4. Roof insulation.
   5. Cover board.
   6. Walkways.

B. Related Sections include the following:
   1. Division 05 Section "Steel Decking" for furnishing acoustical deck rib insulation.
   2. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
   3. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
   4. Division 07 Section “Roof Specialties” for roof edge terminations.
   5. Division 07 Section "Manufactured Roof Expansion Joints."
   6. Division 07 Section "Roof Accessories” for roof hatches.
   7. Division 07 Section "Joint Sealants" for sealants not directly associated with roofing.
   8. Division 22 Section "Facility Storm Drainage Piping" for roof drains.

1.3 REFERENCES

A. American Society of Civil Engineers: Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.

B. American Society of Testing and Materials (ASTM)
   1. ASTM C168 – Standard Terminology Relating to Thermal Insulation.
   2. ASTM C177 – Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
   3. ASTM C209 – Methods of Testing Insulating Board, Structural and Decorative.
   4. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   5. ASTM C1289 – Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   6. ASTM C1303 – Standard Test Method for Estimating the Long Term Change in the Thermal Resistance of Unfaced Closed Cell Plastic Foams by Slicing and Scaling Under Controlled Laboratory Conditions.
   7. ASTM D1079 – Standard Terminology Related to Roofing and Waterproofing.
   8. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
   9. ASTM D2126 – Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
   10. ASTM D2842 – Standard Test Method for Water Absorption for Rigid Cellular Plastics.
   11. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
   12. ASTM E96 – Standard Test Method for Water Vapor Transmission of Materials.
   13. ASTM E108 – Standard Test Methods for Fire Tests of Roof Coverings.

C. National Roofing Contractors Association (NRCA) – Roofing and Waterproofing Manual.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc., (SMACNA) – Architectural Sheet Metal Manual.

E. Underwriters Laboratories (UL) – Roofing Materials and Systems Annual Directory.

F. ANSI/SPRI WD-1: Wind Design Standard Practice for Roofing Assemblies.

G. ANSI/SPRI ES-1: Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

H. National Fire Protection Association (NFPA): NFPA 241-Safeguarding Building Construction Operations.

I. Environmental Protection Agency (EPA): EPA Method 9045.

1.4 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Positive Drainage: The drainage condition in which consideration has been made during design for all loading deflections of the deck, and additional roof slope has been provided to ensure drainage of the roof area within 48 hours of rainfall, during ambient drying conditions.

C. Roof System: A system of interacting roof components generally consisting of a membrane, roof insulation and air or vapor retarder (if present) (not including the roof deck) designed to weatherproof a structure and improve thermal resistance.

D. Pool Environment: The pool environment for special coatings, materials, and treatments includes the competition pool space, pool deck, pool equipment room, pool storage rooms, spectator seating areas and adjacent spaces within the same enclosure. Room numbers as follows: N007, N012, N013, N018, N020, N021, N021A, N022, N027, N035, N036, N037, N039, N102, N104, N107, N109, N201, N202, N203 and N204.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site. A/E will schedule and conduct meeting. Review methods and procedures related to roofing system including, but not limited to, the following:
   1. Meet with Owner; A/E; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   5. Review structural loading limitations of roof deck during and after roofing.
   6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.
   8. Review temporary protection requirements for roofing system during and after installation.
   9. Review roof observation and repair procedures after roofing installation.
   10. Deviations from the project specifications or the approved shop drawings are not permitted without prior written approval by roofing membrane manufacturer, the Owner, and the A/E.

B. Sequencing
   1. Work shall begin only after openings and penetrations are in place and adjacent work required for a complete tie-in is in place. This includes masonry with special attention being given to roof-to-wall transitions. Work shall not begin:
      a. Before the “Preinstallation Conference” has occurred
      b. Until conditions exist necessary for successful completion of roofing.
      c. Without presence and approval of manufacturer’s representative
   2. Prior to and during application, all dirt, devices and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air or similar methods.
   3. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas.
   4. After work on roof is started, no traffic will be permitted on the roof other than necessary for the roofing application and inspection. Materials shall not be piled on to the roof to the extent that design live loads are exceeded. Roofing materials shall not be transported over unfinished or finished roofing or existing roofs.
      a. Work shall begin at the furthest point from the designated spot where materials are shipped to the roof.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Submit specifications, installation instructions, and general recommendations from roofing materials manufacturer for type of roofing required. Include data substantiating that materials comply with requirements of this specification, inclusive of accelerated weathering data.
   1. For insulation and roof system component fasteners, include copy of FM Approvals’ RoofNav listing, SPRI’s Directory of Roof Assemblies listing or manufacturer’s interpretation equivalent.
   2. Storage and handling requirements and recommendations.
   3. Roof Assembly letter from roof membrane manufacturer.

B. Shop Drawings: Submit to membrane manufacturer for review and comments before issuing to A/E. Include plans, elevations, sections, details, and attachments to other Work.
   1. Layout and thickness of insulation, fastener type and length.
   2. Perimeter and penetration details, including base flashings and membrane terminations.
   3. Tapered insulation, including slopes.
   4. Insulation fastening patterns for corners, perimeter, and field-of-roof locations.
   5. Flashing Conditions: Show all roofing conditions, include location and type of all penetrations, including but not limited to drains, perimeter conditions, roof penetration conditions, expansion joints, etc. The shop drawings must be reviewed and approved by the roof system manufacturer to assure the completed installation will meet the manufacturer's warranty requirements.
   6. Wind Uplift Securement: Provide roof plan(s) marked-up to indicate extent of roof corner and roof perimeter areas, inclusive of fastener spacing/density. This drawing must be reviewed and approved by the roof system manufacturer to assure the completed installation will meet the manufacturer's warranty requirements and the "Performance Requirements" listed in this specification.
   7. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.

C. Delegated-Design Submittal: Indicate number of rows and spacing of rows for snow guards and clamps required at locations indicated in accordance with snow guard manufacturer’s design. Submit design formulation. Indicate locations of diverters to protect penetrations.
   1. Snow Retention System Calculations: Include calculation of number and location of snow guards based on snow load, roof slope, panel length and finish, and seam type and spacing.

1.7 INFORMATIONAL/QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system and qualifies to receive manufacturer's 20 year, no-dollar-limit warranty (even if a lesser warranty is specified).

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of meeting performance requirements, including uplift resistance.
   2. Submit insulation fastening patterns for corner, perimeter, and field-of-roof locations to meet performance requirements.
   3. Submit an intent to warrant, executed by authorized representative of system manufacturer, indicating that manufacturer has reviewed drawings, specifications, and conditions affecting the work and, and proposes to provide warranties as referenced herein without further stipulation.
   4. Submit a letter from the roof membrane manufacturer certifying the proposed roofing assembly, compatibility of materials and total R-value of insulation.

C. Qualification Data: For Installer and manufacturer.

D. Sample Warranty: Copy of manufacturer's warranty stating obligations, remedies, limitations, and exclusions before starting work.
   1. Contractor shall submit manufacturers approved "Pre-Installation Notice" (PIN) to A/E.

1.8 CLOSEOUT SUBMITTALS:

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals.
   1. Maintenance Data: For roofing system to include in maintenance manuals.
      a. Roofing membrane manufacturer shall submit a Roof Maintenance and Inspection Manual with warranties and project closeout submittals. (Final payment will not be made until roof maintenance manual is submitted.)
      b. Roof Maintenance and Inspection Manual shall include:
         1) Cover letter recommending to the Owner that 2 roof maintenance inspections should be conducted per year.
         2) Table of Contents.
         3) Visual observation checklist indicating specific flashings and details to be observed. Include items such as base flashing seams, reglets and counterflashings, roof edge flashings, roof penetration flashings, roof curb flashings, boot flashings, roof drain areas, parapet wall flashings, copings, roof membrane seams, skylight flashings, etc. Applicable items shall be listed per project.
         4) Copies of "Project Record" roofing details.
         5) Roof plan indicating penetrations, detail locations, roof drains, and seams.
         6) Final inspection report.
   2. Warranties: Special warranties specified in this Section. When warranties are delivered to the Owner, a cover letter shall be included directing the Owner to inform (copy) the manufacturer as well as the Contractor, when reporting roofing problems, regardless of when they occurred during the warranty period, including any 'Punch List" items.
      a. Contractor shall submit manufacturers approved "Pre-Installation Notice" (PIN) to A/E.
   3. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.9 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications: A qualified manufacturer that is UL listed or listed in FM Approvals' RoofNav or listed in SPRI's Directory of Roof Assemblies for roofing system equivalent to that used for this Project.

a. If details for any manufacturer's systems proposed in the Contract Documents are not acceptable to the Manufacturer, submit corresponding details proposed for the particular application, together with the Manufacturer's reasons for not accepting the conditions depicted in the Contract Documents. No alternate details will be considered without evidence of valid objections by the Manufacturer. All information must be submitted by the Manufacturer on the Manufacturer's letterhead and documentation. Installer submitted items are not acceptable.

b. Manufacturer shall provide inspections. Inspections shall be a minimum of 8 hours per week and a minimum of 2 non-consecutive days when roofing assembly work is being done. Inspections shall be a minimum of 4 hours during any single project visit. These inspections do not include the roofing pre-installation meeting and the final roof inspection. Inspections shall be scheduled randomly with no prior notification and selection of the roofing manufacturer's inspector shall not be influenced by the roofing contractor's preferences.

1) Manufacturer's inspector shall be a field technical inspector employed by the manufacturer not engaged in the sale of products. Inspector shall be experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and to determine installer's compliance with the requirements for the Project and the manufacturer's warranty certification.

2) Manufacturer's inspector services shall include examination of substrates and conditions prior to membrane installation including verification of fastening of substrate to structure. Inspections shall also include observation of membrane installation, detailing, flashing, in progress work, and complete portions of the work.

3) Manufacturer's inspector may not approve a roof installation as warrantable or acceptable if any current condition of the application of the new system does not meet the current published manufacturer's standards or submittals without review by A/E. The warrantability issue is part of the Contract Documents and does not take precedent over all contract requirements.

4) Manufacturer's inspector after site visit shall provide a written report to the A/E and roofing contractor. Report shall indicate existing conditions on day of inspection, work occurring, observation of work, workmanship and materials stored at the project site. A minimum of 5 pictures of roofing work shall be included in the reports. Reports shall be submitted within 7 days of the site visit.

2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to install and receive a manufacturer's 20 year (or manufacturer longest period for specified product) no-dollar-limit warranty. Installer must verify this approval with a letter from manufacturer and supply letter even if a lesser warranty is specified.

a. The Contractor shall obtain from the roofing manufacturer copies of each roof inspection and furnish a copy to the A/E. The Contractor shall inform the roofing manufacturer, with regard to warranties, that warranties shall be issued, based upon the acceptance of the roofing work, and that deficiencies noted on inspection reports have been corrected. The manufacturer shall not refuse or restrict the provisions of its warranty, based upon deficiencies noted on inspection reports, especially any report that may not have been furnished to the A/E. Inspections shall be a minimum of 3 and scheduled randomly (no prior notification) and selection of the roofing manufacturer's inspector(s) shall not be influenced by the roofing subcontractor's preferences. The A/E will not approve final payment of roofing work until final and interim inspection reports and warranty are in hand. The A/E's representative shall accompany the manufacturer's inspector and Roofing Installer during final inspection prior to issuing manufacturer's warranty.

b. The roofing installer shall have on the job whenever roofing work is being done, a foreman/supervisor with a minimum 3 years experience in the type of roofing specified or the roofing manufacturer's technical field representative and provide adequate number of experienced workman regularly engaged in this type of work who are skilled in the application techniques of the materials specified.

3. Roofing and associated work shall be performed by a single firm called the "Installer" in this Section, so that there will be undivided responsibility for the specified performance of components parts including, but not limited to, the following (even through some parts may be subcontracted to others):
   a. Division 06 Section "Rough Carpentry": For wood insulation shops, wood nailers, and blocking required for installation of new roof and sheet metal.
   b. Division 07 Section "Sheet Metal Flashing and Trim."
   c. Division 07 Section "Roof Specialties."
   d. Division 07 Section “Roof Accessories”.

B. Source Limitations: Obtain components, including roof insulation and fasteners, for membrane roofing system from or approved by roofing membrane manufacturer in writing.

C. There shall be no deviations made from this specification or shop drawing without prior written approval of the A/E. Any deviation from the manufacturer’s installation procedures must be supported by a written certification on the manufacturer’s letterhead and presented for the A/E’s consideration.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
   1. All materials delivered from manufacturers and suppliers should be carefully inspected at the time of delivery and examined during unloading. Manufacturers’ product labels should be intact. Any damaged or unsuitable material should be rejected. Material that has been exposed to weather in transit or storage should be examined carefully for deterioration and damage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
   2. Lids should be secured on cans of stored material.
   3. Water-based materials such as asphalt emulsions, acrylic coatings and water-based adhesives should be protected from freezing.
   4. Solvents, adhesives, and sealants should be stored at proper temperature. Read instructions contained on adhesive canister for specific storage instructions.
   5. Store seam tapes and adhesives above 60 degrees F, unless otherwise recommended by manufacturer.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
   1. When moisture-sensitive materials are stored outside, they shall be placed on pallets or platforms that are raised off the ground or roof deck (at least 4 inches). Materials sensitive to moisture should be covered with water-resistant coverings that have been properly secured. Coverings that are “breathable,” such as water resistant canvas tarpaulins are preferred. Factory applied shrouds used for shipping alone are not acceptable. Cover top and sides of materials and secure cover. Remove wet products from project site.
      a. During inclement seasons, or extended periods (two weeks) it is suggested that moisture sensitive materials be stored in vans or enclosed areas protected from moisture or elevated humidity.

b. Materials determined by A/E to be damaged or to have been subjected to adverse conditions shall be removed and replaced at contractor's expense.

2. Protect insulation against concentrated loads, and standing loads exerting a force in excess of 50 percent of the materials compressive strength.

3. Do not expose foam core to excessive heat, sparks, or open flame.

D. Single-ply sheet materials may be stored as shipped with rolls laying horizontally or as recommended by manufacturer.

1. When rolled materials are stored, the storage substrate should be swept to rid the surface of loose gravel, share objects and other debris that could damage the membrane material.

2. Cover with tarps so moisture does not gather in the rolls. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weld ability.

E. Provide continuous protection of products during delivery, storage, handling, and application.

F. Do not store roofing materials in concentrated areas of roof deck.

1. Stored material should be raised up off the roof surface out of any standing water.

G. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1. Average live loads on the roof during the work shall not exceed twenty pounds per square foot at any time.

H. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Closely follow precautions/instructions outlined on container or supplied by manufacturer/supplier.

1. Liquid propane (LP) gas containers shall be in an upright position at all times.

a. Comply with NFPA 58 "Standard for the Storage and Handling of Liquified Petroleum Gases" as well as appropriate publications of the National LP Gas Association.

1.11 FIELD CONDITIONS

A. Weather Condition Limitations

1. Proceed with roofing and associated work only when weather conditions will permit unrestricted use of materials and quality control of the Work being installed, complying with the requirements and with the recommendations of the roofing materials manufacturer.

a. Proceed only when the Installer is willing to guarantee the work as required and without additional reservations and restrictions.

2. Apply in dry weather on a dry deck only. Where rain or inclement weather occur during application, the Work shall stop and not resume until the weather has cleared and the deck is dry.

a. When membrane roofing materials are applied, entrapment of moisture should be prevented. Moisture in or on materials may cause membrane problems. If precipitation occurs before completely installing the roof membrane, the membrane surface in the immediate work area and the substrate should be dried or allowed to dry before work resumes.

3. Only as much roofing as can be made weathertight each day, including all flashing and detail work, shall be installed.

a. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

4. Cold Weather
   a. When the outside temperature is below 40 deg F, certain combinations of temperature and humidity may cause condensation on the surface of solvent-based adhesives and primers. If this condition occurs, discontinue the application. When the ambient air conditions no longer cause condensation on adhesive surfaces and the membrane is clean and dry then re-apply additional adhesive or primer and proceed.
   b. The consistency of sealants, adhesives and primers will begin to thicken as the temperature drops. To minimize this, the following is recommended:
      1) Start work with sealants, adhesives and primers that have been stored between 60 and 80 deg. F. Insulated and heated boxes may be helpful.
      2) Complete test areas to determine if conditions will cause problems such as condensation with the application of the materials.
      3) Stop the operation or change to another warm container when material becomes too thick to properly apply.
   c. When the outside temperature is below 40 deg., installation of the roofing system may require additional application procedures, consult with manufacturer:
      1) Ensure that the roof surface is dry. Moisture, even trace amounts, may cause poor adhesion, and may lead to moisture entrapment within the roofing system.

B. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

C. The applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

D. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

E. Membranes are slippery when wet or covered with snow, frost, or ice. Working on surfaces under these conditions is hazardous. Appropriate safety measures must be implemented prior to working on such surfaces. Always follow OSHA and other relevant fall protection standards when working on roofs.

F. Construction Traffic: Construction site traffic from all trades should be limited to designated areas and walkways. Completed roof membranes are not suitable as work platforms or staging areas for other trades. If construction traffic is anticipated or inevitable, the use of temporary roofs can act as a sacrificial traffic surface, allowing for construction traffic and abuse until the primary weatherproofing membrane is installed.

1.12 WARRANTY

A. Special Total System Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
   1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, substrate board, vapor retarder, and other components of membrane roofing system, including metal work i.e. coping and roof edge-specialties.
   2. The warranty shall guarantee the roof membrane system at wind speeds up to 72 mph measured at 10 meters above ground.
   3. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
   4. Warranty Period: 20 years from date of Substantial Completion.
   5. Pro-rated System Warranties are not acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacturer, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
   1. Accelerated Weathering: Roofing system shall withstand 2,000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
   2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746, ASTM D 4272 or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Roofing System Design: Provide a membrane roofing system that is listed on IBC ES-Reports or is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 and also tested in accordance with FM 4474, UL 580, or UL 1897.
   1. Fire/Windstorm Classification: Calculations shall not result in a roofing design less than FM Class 1A-60 requirements.

D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and components materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
   1. Hail-Resistance Rating: SH.
   2. Where exact assembly of materials have not been classified with a RoofNav number, provide Manufacturer's interpretive equivalent RoofNav number for specified assembly and demonstrate assemblies compliance with wind uplift requirements included herein.

E. SPRI's Directory of Roof Assemblies Listing: Roof membranes, base flashings, and component materials shall comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical to that specified for this Project.
   1. Where exact assembly of materials have not been classified in the SPRI's Directory, provide Manufacturer's interpretive equivalent for specified assembly and demonstrate assemblies compliance with wind uplift requirements included herein.

F. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1987;
   1. Roof Areas: New Natatorium high sloped roof areas.
      a. Field-of-Roof Uplift Pressure (Zone 1): 45.2 lbf/sq.ft
      b. Perimeter Uplift Pressure (Zone 2): 78.8 lbf/sq.ft.
      c. Corner Uplift Pressure (Zone 3): 116.4 lbf/sq.ft.
   2. Roof Areas: All other areas.
      a. Field-of-Roof Uplift Pressure (Zone 1): 45.1 lbf/sq.ft
      b. Perimeter Uplift Pressure (Zone 2): 75.7 lbf/sq.ft.
      c. Corner Uplift Pressure (Zone 3): 113.8 lbf/sq.ft.

G. Polyisocyanurate Insulation
   1. Compressive Strength: 20 psi min.
   2. Dimensional Stability – maximum dimensional change after installation (inches).
      a. Length: +/- 1/8
      b. Width: +/- 1/8
      c. Thickness: +/- 1/16
      d. Squareness: 1/16
      e. Flatness: 1/16
   3. Moisture Vapor Transmission: ASTM E96, <1 perm.
   4. Water Absorption: ASTM C209, <1 percent by volume.
   5. Flame Spread: ASTM E84, <50.
   6. Service Temperature: Minus 100 degrees to 250 degrees F.
   7. Smoke Developed: ASTM E84, <450.
   8. Acidity: EPA Method 9045, 6 pH minimum, 8 pH maximum.
   9. Aged R-Value per Inch: ASTM C177 and C518, 5.6 R.

H. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency, unless otherwise noted.

2.3 PVC ROOFING MEMBRANE

A. Low Slope PVC Sheet: ASTM D 4434, Type III, fabric reinforced.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. SureFlex PVC; Carlisle SynTec Systems.
      b. EverGuard PVC; GAF Materials Corporation.
      c. JM60PVC; Johns Manville, Inc.
      d. Sikaplan; Sika-Sarnafil Inc.
      e. MF/R-60 PVC; Flex Membranes International, Inc.
   2. Thickness: 60 mils, nominal.
   3. Exposed Face Color:
      a. Provide White or gray at all low-slope applications, unless otherwise noted.

B. Steep Slope/Vaulted/Curved PVC Sheet: ASTM D 4434, Type II or III, Grade I, 60 mil fabric reinforced membrane, with factory applied, minimum, 3 oz. felt backing.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Sika-Sarnafil Inc. G410 Feltback fiberglass reinforced membrane with a lacquer coating.
      b. Flex Membranes International, Inc., Flex FB 60.
      c. Carlisle Syntec Systems, 115 PVC
      d. Johns Manville, Inc.
      e. GAF Materials Corporation
   2. Exposed Face Color: White

C. Low and Steep Slope/Vaulted/Curved Ketone-Ethylene-Ester-Based Sheet Roofing (KEE): ASTM D 6754, KEE polymer shall be a minimum of 50 percent by weight of the polymer content of the sheet. Sheet shall be reinforced internally with a fabric. Physical properties shall conform to the following:
   1. Thickness: 60 mils, nominal plus 3 oz. minimum felt backing.
      a. Felt backing not required at low slope areas.
   2. Thickness over fiber, minimum, mm (in.): 0.15 (0.006)
   3. Manufacturers:
      a. FiberTite Systems, Seaman Corporation.
      b. Carlisle Syntec Systems, KEE HP
      c. Tremco
   4. Exposed Face Color: White

2.4 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
   1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane, unless otherwise noted.

C. Sheet Flashing: 60-mil thick EPDM, partially cured or cured, according to application.
   1. Provide pressure-sensitive flashing, nominal 30 mil cured, pre-applied adhesive. Provide a minimum 6 inch wide roll to flash metal edging and seams where required herein.
   2. Location: Where required by new work at existing EPDM membrane roofing.

D. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive, water-based bonding adhesive shall be utilized unless cold conditions require the use of solvent-based adhesives and their use is approved by A/E.

E. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer’s standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.

F. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer’s standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.

G. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

H. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
   1. Use only where indicated. In areas where metal counterflashing or surface mounted reglets are used they must be sealed with a sealant to prevent moisture migration behind the flashing.

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals Corrosion Test, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
   1. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4 inch and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch and shall be approved for such use by the fastener manufacturer.
   2. Pullout Value: Fastener shall provide a minimum pullout of 450 pounds.
   3. Static Backout Resistance: Fastener shall provide a minimum static backout resistance of 10 inch pounds.

4. Where fasteners will be in contact with wood treated with preservative chemicals, provide fasteners and anchorage with hot dip zinc coating of G90 complying with ASTM A153 or of Type 304 or 316 stainless steel.

J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.
   1. Water Cut-Off Sealant: Butyl-based, non-curing, non-hardening sealant.
      a. Manufacturers:
         1) Sika Corporation; Sikalastomer – 511.
         2) Schnee-Morehead; Acryl-R SM 5430.
         3) Edge Adhesives; Rubex Non-Skinning Butyl Sealant.
   2. Sealant: 1 or 2 component polyurethane-based sealant meeting ASTM C 920, Type S, Grade NS, Class 35, Use NT, M, A, G, and I. Manufacturer-approved primers are required. Color to match adjacent material.
      a. Manufacturers
         1) BASF; MasterSeal NP 1.
         2) Schnee-Morehead; Permathane.
         3) Sika Corporation; Sikaflex-1a.
   3. Sealant Primers: Sealant primer is a quick-drying solvent-based primer for priming joints and substrates before the application of sealants.
      a. Manufacturers
         1) BASF; Sonolastic Primer 733.
         2) Sika Corporation; Sikaflex Sealant/Admixture Primer.
         3) Schnee-Morehead; Primer.
   4. High Temperature Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O with a service temperature up to 300 degrees F. For use in through-penetration firestops.

K. Secondary Seal/Flexible Vapor Retarder: Continuous waterproof EPDM membrane ASTM D 4637, or Neoprene membrane within joint and attached to substrate on each side.
   1. Expansion joints

L. Thermal Insulation/Compressible Insulation: Mineral-fiber blanket, ASTM C 665, to fill space above secondary seal/flexible vapor retarder.
   1. Maximum flame-spread and smoke-development indexes of 25 and 50 respectivel, per ASTM E 84.
   2. Expansion joints.

M. Flexible Foam Rod: Closed-cell support foam in configuration indicated on Drawings.
   1. Expansion joints.

N. Splash Blocks: 16 inch square by 2 inch thick precast 5000 PSI concrete with mix added water-repellent additive and striated top finish.

O. Snow Guards: Prefabricated, noncorrosive units designed to be installed with membrane roofing and complete with predrilled holes for anchoring.
   1. Product: Alpine SnowGuards, No. 115-2 pipe System for membrane roofing.
      a. Acceptable Manufacturers:
         1) Sno Gem
   2. Brackets: 600 Series Aluminum or stainless steel, No. 115 profile, spaced as required by manufacturer per Delegated Design requirements.
   3. Base Plate: 11 gauge thick 304 stainless steel.
      a. Where required by roofing manufacturer's details and installation instructions, provide compatible PVC coating.
   4. Tubing: 6005-T5, 1 inch square and .120 inch wall thickness extruded aluminum.
   5. Threaded Couplings: 6061-T6 aluminum.
   6. End Caps: 302 stainless steel.
   7. Ice Flags: 5052-H32 aluminum.
   8. End Collars: 6061 T-6 aluminum shaft collars.

9. Fasteners: 302 or 304 stainless steel.
   a. Fasteners shall be compatible with roof deck and strength should equal or exceed that of snow guard system.
10. All materials shall be provided with powder coat finish to match roofing material.
11. Drawings indicate minimum requirements for snow guards. Delegated-design submittal and snow retention system calculations shall be final determination of extents and location.

P. Protection Sheet: An extra sacrificial layer of roofing membrane. Thickness shall be equal to or greater than thickness of field membrane.
   1. Locations: Snow guard base plates, under splash blocks, under scuppers, and at downspouts terminating at another lower roof and other locations as indicated on Drawings.

2.5 SUBSTRATE BOARDS

A. Substrate Board (Thermal Barrier at High-Humidity Environments): ASTM C 1325, cement board, 7/16 inch thick manufactured of Portland cement, lightweight aggregate and glass mesh and able to withstand prolonged exposure to moisture.
   1. Basis-of-Design: Dexcell Cement Roof Board; National Gypsum Company.
   2. Location: Over Pool Environment roof locations.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening substrate panel to roof deck.

2.6 VAPOR RETARDER/BARRIER

A. Vapor Retarder/Barrier: Provide one of the following as recommended by membrane manufacturer for compatibility in roofing assembly indicated.
   1. Self-Adhering-Sheet Air and Vapor Retarder: ASTM D 1970, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil-total thickness; maximum water vapor permeance rating of 0.1 perm and air permeability of less than 0.04; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
   2. Self-Adhering-Sheet Air and Vapor Retarder: Polyethylene film laminated to layer of butyl rubber adhesive, minimum 30-mil total thickness; maximum water vapor permeance rating of 0.1 perm and air permeability of less than 0.04; cold-applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
   3. A 106 mil thick self-adhered SBS polymer modified bitumen vapor retarder/air barrier with a non-woven polyester mat reinforcement and fine mineral aggregate (sand) topside.
   4. Location: Over substrate board at Natatorium (Pool) and existing Natatorium (pool) roof areas.

B. Provide adhesive/primer supplied by air and vapor barrier manufacturer for adhesion to concrete or masonry surfaces.

C. Vapor Retarder/Barrier Laminate Sheet: Polyethylene laminate, two layers, reinforced with cord grid, with maximum permeance rating of 0.06 perm.
   1. Location: Over standard low slope and curved metal deck areas.
   2. Manufacturers
      a. Griffolyn Type – 65; Reef Industries.
      b. DURA-SKRIM 6WW; Raven Industries.
      c. WMP-VR; Lamtec Corporation.
      d. PE-10; Sika-Sarnafil.

D. Auxiliary Materials
   1. Tape: 4 inch wide self-adhesive pressure sensitive air barrier tape with flame spread index of 25 or less, smoke-developed index of 50 or less provided by or recommended by vapor retarder manufacturer for sealing seams and penetrations (i.e. curbs).

2. Pipe Flashings (with deck flanges): Sized to fit typical penetrations (i.e. water lines, gas lines, drain pipes, and vent pipes).
3. Butyl Tape: 1.5 inches to 2.0 inches wide 35 mil butyl tape used to seal the perimeter edge and penetrations through the air barrier.

2.7 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
1. Insulation must be manufactured by or approved in writing by membrane manufacturer for system specified. Insulation must meet requirements for manufacturers total system warranty requirements and comply with FM 4450 or UL 1256.

B. Polyisocyanurate Board Insulation: ASTM C 1289-11A, Type II, Class 2 Grade 2 min., coated polymer bonded glass fiber mat facer on both major surfaces. Facers shall be non-organic biological growth resistant. Provide Grade 3 when required by manufacturer to meet Performance and Warranty requirements.
1. (LTTR) Thermal resistance of insulation shall be calculated as 5.6 per inch.
2. Roof insulation assembly shall be a minimum thermal resistant value of R=20.
3. Nominal total thickness, 4 inches minimum, unless otherwise noted.
   a. Bottom Layer: 2 inch, maximum.
   b. Thickness of board can be reduced to 1 inch or 1.5 inch over curved roof areas to better conform to curve and attachment method.
4. Size: Restrict boards installed in adhesive to 4 foot by 4 foot.

C. Tapered Insulation (Field-of-Roof): Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated.
1. Polyisocyanurate Insulation
   a. Minimum Thickness: 1/2 inch, unless otherwise noted.
   b. Average Thickness: 4 inches, calculated using the Volumetric Average Thickness method.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
1. Slope: 1/2 inch per foot, unless otherwise indicated on Drawings.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FM Approvals Corrosion Test, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer. The type of fastener shall be appropriate for the substrate to achieve maximum withdraw and anti-corrosion characteristics. The membrane manufacturer approved fasteners shall also meet the following requirements:
1. FM 4470 SPRI Corrosion Test Procedure and Guidelines for Roofing Fasteners. To pass, the fasteners shall not accumulate more than 15 percent red rust after the "required number cycles" in the Kesternich cabinet.
   a. FM and SPRI recommended number, but in no case shall it be less than 15.
2. Pullout Value: Fastener shall provide a minimum pullout of 450 lbs.
3. Static Backout Resistance: Fastener shall provide a minimum static backout resistance of 10-inch pounds.
4. Steel Deck
   a. Fasteners to have self-drilling tip. Fastener tip shall be capable of cutting steel deck material of 20 gauge thickness at point of steel deck segment overlap without damage to the fastener tip.
   b. Fasteners shall be installed in high flute of metal deck with a minimum of three-quarter inch (3/4 inch) penetration. Fasteners shall not extend past the bottom of the metal deck.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
   1. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
   2. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

D. Cover Board: Provide one of the following coverboards as approved by roofing manufacturer for system specified:
   1. ASTM C 1177, glass mat, water resistant gypsum substrate (primed). Facers shall be non-organic biological growth resistant).
      a. Manufactures:
         1) DensDeck Prime with EONIC Technology; Georgia-Pacific Gypsum.
         2) DEXcell FA; National Gypsum.
         3) GlasRock Roof Board; CertainTeed Corporation.
         4) Securock UltraLight Coated Glass-Mat Roof Board; USG
   2. Thickness: 1/4-inch minimum. Provide 1/2-inch thickness where required to meet assembly or warranty requirements.
   3. Cellulosic-Fiber Board is not an acceptable substitute. Materials shall be non-organic and biological growth resistant.

E. Sprayed-Polyurethane Foam Sealant: 1 or 2 component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 16/cu.ft. density; flame spread index for 25 or less according to ASTM E 162; with primer and non-corrosive substrate cleaner, if recommended by foam sealant manufacturer.
   1. Provide single-component polyurethane sealant low-expansion sealing gaps less than 1/2 inch.
   2. Provide one component foam for voids from 1/4 to 2 inches.
   3. Manufacturers
      a. Dow Chemical Company
         1) Great Stuff Pro Gaps and Cracks; gap $\leq$ 1/2 inch
         2) Froth Pak Foam Sealant; gap $\leq$ 1/2 inch
      b. Convenience Products
         1) Home Seal; gap $\leq$ 1/2 inch
      c. FOMO Products
         1) Extreme; gap $\leq$ 1/2 inch
         2) Handi Foam; gap $\leq$ 1/2 inch
      d. Hilti Corporation
         1) CF810; gap $\leq$ 1/2 inch

F. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resistant, surface-textured walkway pads or rolls, approximately 30- to 39-inches wide by at least 0.072-inchthick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
   1. Material manufacturers printed installation instructions are available for information and review.
   2. Safety precautions and safety data sheets (SDS's) are available during application.
   3. Specified materials and specified quantities, as verified by on-site inspection of product labels, are at the project site and are usually suitable for application (e.g., packaging not damaged, labels intact).
   4. Materials are stored according to the manufacturers recommendations (e.g., proper temperature, covered, off ground, on pallets).
   5. Equipment is in good working order and functioning properly.

6. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
7. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation and have been installed in areas to receive roofing.
    a. Verify existing fastening to comply with FM 1-49 requirement and enhance to secure as required.
    b. Replace deteriorated sections with new dimensional lumber of the same size.
8. Verify work required for complete tie-in is in place. This includes masonry with special attention given to roof to wall transitions.
    a. Verify that all counterflashing receivers, curbs, etc., are constructed in such a manner as to provide a minimum 8 inch base flashing height measured from the finished roof's surface to the top of the base flashing membrane.
9. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 05 Section "Steel Decking."
10. Drainage patterns for proper roof membrane installation have been identified.
11. Verify all surfaces are smooth and free of dirt, debris and incompatible materials and free of water, ice and snow.

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

3.2 PREPARATION

A. Review "Performance" and "Warranty" requirements with membrane manufacturer to ensure compliance before beginning roofing work.

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
1. Roof deck must be free of ponding water within 48 hours of rainfall. Use corrective measures to provide positive drainage.

D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
1. When completion of flashings and terminations is not completed by the end of each workday, provisions must be provided to temporarily close the membrane to prevent water infiltration. Phased roofing is not acceptable.
2. Temporarily seal loose membrane edge down slope so that the membrane edge will not buck water. Caution must be exercised to ensure that membrane is not temporarily sealed near drains in such a way as to promote water migration below membrane.

3.3 APPLICATION, GENERAL

A. Application of the roofing products for installation shall be in accordance with the roofing material manufacturer's written instructions, for installation procedures and requirements not addressed in manufacturer's written instructions comply additional requirements of the project specifications and drawings, including recommendations of NRCA, SMACNA, and SPRI. Material manufacturer's recommendations related to weather (temperature, moisture, and humidity), surface preparation, and shelf life must be observed.

B. Only install as much roofing as can be made weathertight each day, including all flashing work.
1. Where possible, roof membrane panels shall be installed in such a manner as to create water-shedding seams.

C. Dry Surfaces: All surfaces to receive new insulation, membrane, or flashings shall be thoroughly dry.
   1. Metal deck surface to receive substrate board or insulation shall be thoroughly dry. Should surface moisture occur, the Contractor shall provide the necessary equipment to dry deck surface prior to application of roofing components.
      a. This is acceptable for metal roof deck only. Drying of roofing components including substrate board, insulation, and cover boards is not acceptable. If any of these products have moisture in them, or have had moisture on them they shall be removed and replaced.
      b. Roof decks shall be rigid, tight, dry, and clean of dust or debris. Now work shall start without testing of deck dryness at the beginning of each work day or period. It shall be the responsibility of the Contractor to maintain the deck in the proper and acceptable condition of application of the roof covering.
         1) Installer shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages.

D. All new and temporary construction, including equipment and accessories, shall be secured in such a manner, at all times, as to preclude wind blow-off or wind damage.

E. Temporary water stops shall be installed at the end of each day's work, and shall be removed before proceeding with the next day's work. Temporary water stops shall be constructed to withstand protracted periods of inclement weather. Water stops shall be compatible with all materials and shall not emit dangerous or incompatible orders.

F. The Contractor is cautioned that the roof membrane may be incompatible with certain substances. Such materials shall not come into contact with the roof membrane at any time. If such contacts occur, the material shall be cut out and discarded. The Contractor shall consult material manufacturer with respect to material compatibility precautions, and recommendations.

G. If any unusual or concealed condition is discovered, stop the work and notify the A/E immediately in writing.

H. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified.

I. Quality Control (During Application) Checklist
   1. Weather and job conditions are suitable for the application.
   2. Substrate is sufficiently dry and suitably prepared to receive the insulation and roof membrane.
   3. Insulation and cover boards, if applicable, are butted together, as required, with joints staggered and offset if more than one layer is being used.
   4. Insulation is firmly attached with specified type and number of fasteners, or embedded in adhesive to substrate or underlying insulation as specified.
   5. Temporary water cut-offs are installed at the end of each day’s work as required.
   6. Membrane sheets are installed to side laps and end laps that buck water are minimized.
   7. Perimeter membrane fastening complies with specifications and manufacturers’ requirements.
   8. Membrane flashings are installed along with each day’s completed roof area.
   9. In high-traffic areas, protection board is being used over newly completed membrane.
      a. Roof is not being abused by other trades.

3.4 SUBSTRATE BOARD INSTALLATION

A. Install substrate board in accordance with manufacturer’s recommendations. Long joints shall be in continuous straight lines, perpendicular to roof slopes with end joints staggered not less than 24 inches in adjacent rows.
   1. Tightly butt substrate boards together.
   2. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

3. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturer's written instructions and as required to meet “Performance Requirements.”
    a. Support the two opposite sides of each board on steel deck flanges, as close as practical to the center of the flange with a minimum bearing width of 1 inch. Trim board edges if they veer off the flange center.

3.5 VAPOR RETARDER/BARRIER INSTALLATION

A. Vapor Retarder/Barrier Installation
1. All surfaces must be clean, sound, dry, and free of loose materials or contaminants with as water, frost, ice, oil, and grease that would interfere with proper adhesion and compromise the performance of the product.
2. Apply air and vapor barrier from high to low points in a shingle fashion, so that the laps will shed water. Overlap edges by at least 2-1/2 inches. End laps should be staggered. Position membrane carefully so as to avoid fish-mouths and wrinkles. Immediately after installation, roll the membrane with a 100 pound roller wrapped in a resilient material.
    a. On steel decks install a 6 inch by 42 inch metal plate under the end lap to support the membrane between the steel flutes. Stagger the end laps by at least 12 inches.
3. Inspect all membranes for tears, punctures, fish-mouths, blisters, and voids due to misalignment at seams. Remove damaged membrane. Apply a new section of membrane extending at least 6 inches on to underlying adhered membrane on all sides. Firmly roll repaired area with a 2 inch hand roller to ensure a good seal.

B. Completely seal vapor retarder at terminations (perimeter), obstructions, and penetrations to prevent air movement into membrane roofing system.
1. Turn vapor retarder up parapet, prime and adhere to substrate.
2. Apply manufacturer’s mastic to seal around penetrations, T-joints, and fishmouths. Use a trowel to mound the mastic around the penetrations to seal the opening. Do not apply mastic where it may come into direct contact with the membrane.

C. Vertical control/expansion joints through parapet walls shall be sealed with butyl tape or sealant prior to installation of the vapor retarder.

D. All surfaces to receive the vapor retarder shall be dry prior to installation.

E. Loosely lay polyethylene and/or polyethylene film vapor retarder in a single layer over entire roof deck extending to roof edges and to adjacent walls. Turn vapor retarder film up any vertical walls or penetrations.

F. Side and end lap each sheet a minimum of 2 inches and 6 inches respectively.

G. Vapor retarder, loose lay polyethylene type, shall be positively sealed at all edges, penetrations and walls utilizing manufacturer’s vapor retarder accessories.
1. Seal laps with continuous strip of tape recommended by the air barrier manufacturer.
2. Penetrations
    a. Round Pipes: Seal with a pre-manufactured pipe boot or butyl tape to seal to pipe.
    b. Curbs: Seal with butyl tape to seal to the side walls of the curb.
3. Roof Drains: Seal to exterior side of drain bowl with butyl tape.
4. Seal vapor retarder to the steel deck of roof edges with butyl tape. At edges of the deck where there are corrugations, the flutes on the top side of the roof deck shall be filled with spray foam insulation and then trimmed flush. The spray foam insulation shall provide a continuous surface where the vapor retarder can be sealed.

3.6 INSULATION BOARD INSTALLATION

A. Comply with roofing system manufacturer's written instructions for installing roof insulation, including warranty requirements for installing insulation.
   1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
   2. Size: Restrict boards installed in adhesive to 4 foot by 4 foot.

B. Roof Insulation – General: Lay in multiple layers. Edges shall be butted to provide moderate contact but not deformed or placed in surface compression. Neatly cut and fit insulation around projections and vertical surfaces. Edges shall be mitered at ridges and elsewhere to prevent open joints or irregular surfaces. Stagger end joints (6 inches) in adjoining courses of base course. Stagger joints in succeeding layers with joints of layer below.
   1. Insulation shall be installed in multiple layers except a single layer may be used for one board width, around drains, if thickness at drain is 2-1/2 inches or less.
      a. No single layer of insulation shall exceed 2 inches. Other locations shall be made up of 2 or more layers with staggered joints in both directions.

C. Install tapered insulation under area of roofing to conform to slopes indicated. Tapered insulation combined with tapered saddles and drainage crickets shall achieve positive drainage. Tapered saddles at a 1/2 inch per foot slope shall be placed between drains, and crickets shall be placed on the up slope side of mechanical, skylight, and other curbs to provided positive drainage. Mechanical units should not restrict flow of runoff water.
   1. Refer to NRCA Roofing and Waterproofing Manual – 2011, Figure 10-7, “Guide for Crickets and Saddles” and Figure, “Guide for "Crickets.”
   2. Tapered insulation shall be installed between the bottom and top layer of flat stock insulation. This will prevent stepped transitions from occurring at the edge of tapered insulation boards.
   3. Tapered insulation should originate at the valley line/low point of the roof in lieu of the center of the roof drains. The structure often causes the roof drains to be offset from the valley line/low point of the roof. Saddles/crickets shall provide positive slope towards drains and not allow ponding to occur in valley lines.
   4. Use tapered insulation to provide a square sump centered on drains. 12 by 8 foot square sump centered on drains is preferred.
      a. 12 by 8 foot sump is preferred, where sump is not limited by penetrations.
      b. Do not field taper insulation.

D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation or low-rise urethane adhesive.
   1. Support the two opposite sides of each board on steel deck flanges, as close as practical to the center of the flange with a minimum bearing width of 1 inch. Trim board edges if they veer off the flange center.
   2. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
   3. Fill remaining gaps around projections, penetrations, and perimeter with low-rise urethane adhesive (foam), including but not limited to:
      a. Between perimeter of insulation boards and nailers.
      b. Between nailers and vertical walls.
      c. Between penetrations and insulation boards.
      d. Between voids in insulation boards, inclusive of roof system slope transition conditions.
   4. All voids to be filled to match full thickness of insulation boards.
   5. Provide urethane foam sealant produced or acceptable to the roofing system/installation system manufacturer.

E. Adhered Insulation over Metal Deck: Install each layer of insulation and/or cover board adhere to substrate by one of the following methods as approved by the membrane manufacturer.
   1. Set each layer of insulation in an adhesive. Provide one of the following as recommended by manufacturer:
      a. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

b. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive.

2. Size: Boards installed in adhesive shall limited to 4 foot by 4 foot.

3. Location: Where substrate board and vapor retarder/barrier is indicated over Natatorium roof areas.

F. Mechanically Fastened and Adhered Insulation over Metal Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
   a. Fasteners shall be installed in high flute of metal deck with a minimum of 1-inch penetration.
   b. Fastener and plate setting shall be executed with an automatic setting device to ensure uniformity and correct setting torque.
2. Install subsequent layers of insulation and/or cover boards in one of the following methods:
   a. Ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
   b. Full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
3. Size: Restrict boards installed in adhesive to 4 foot by 4 foot.
4. Location: Over vapor retarder/barrier on standard metal deck.
5. Location: Over vapor retarder/barrier over curved metal deck.
   a. At curved metal deck above main entrance, fully mechanical fastened insulation is permitted if required by curve of roof.

3.7 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.
   a. Trim cover board so that water flow is unrestricted.
3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification or SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
   a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
   b. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

B. If required by manufacturer or tested assembly, install slip sheet over cover board and immediately beneath roof membrane.

3.8 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. In addition, the corner and perimeter areas shall have enhanced fastening in accordance with FM1-29. Unroll roofing membrane and allow to relax before installing.

1. Install sheet according to ASTM D 5036.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel, A/E, and testing laboratory representative, if required.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply bonding adhesive to substrate at rate required by manufacturer and immediately install roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
   1. The membrane adhesive shall be installed per the membrane manufacturer's requirements. Note: Differing insulation facers require specific application methods and quantities of adhesives. Water-based adhesives should be utilized (unless cold conditions require the use of solvent-based adhesives); inclusive of manufacturer's required fasteners and additional fastener requirements as required to meet performance requirements.
      a. Conversion to the solvent-based adhesive shall be only with permission from the A/E.
      b. Bidder is cautioned to include the type of bonding adhesive that the membrane manufacturer will warrant based on the conditions under which the roof will be installed.

E. Fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing. The roofing membrane shall be secured to nailers.
   1. Membrane shall be secured at the perimeter of each roof level, roof section, expansion joint, curb, skylight, interior wall, penthouse, etc., at any angle change which exceeds 2 inches in one horizontal foot and at all other penetrations in accordance with manufacturer's details.
   2. Terminate membrane under a termination bar, metal fascia or coping, unless otherwise noted or approved as part of submittal process.
   3. Provide premolded accessories and corners, unless otherwise noted or approved as part of the submittal process.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible. Determine the direction of water drainage and the low point of the deck. The orientation of both ends and side laps shall be such that the direction of water flow (slope) changes to avoid backwater laps.
   1. Allow sufficient membrane to cover parapet walls and flashing details at roof edge.

G. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

H. Install roofing membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and not to void warranty of existing roof system, if applicable.

3.9 HOT-AIR WELDING OF SEAM OVERLAPS

A. General:
   1. All seams shall be hot-air welded. All membrane to be welded shall be clean and dry.
      a. All mechanics interceding to use hot-air welding equipment shall have completed a training course provided by either the membrane or welding equipment manufacturer prior to welding.
   2. Hot-air welding equipment shall be allowed to warm up as directed by manufacturer prior to welding.
   3. Seam overlaps shall be minimum 3 inches wide when automatic machine-welded and 4 inches wide when hand-welding, except for certain approved details.
      a. Width of membrane seams shall not be less than 1-1/2 inches regardless of seaming technique.

B. Hand-Welding
   1. The back edge of the seam shall be welded with a narrow, but continuous weld to prevent loss of hot air during the final welding.

2. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow", the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch wide nozzle shall be used.

C. Machine Welding
1. Machine welded seams are achieved by the use of approved automatic welding equipment. When using this equipment, all instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable general is recommended. No other equipment shall be operated simultaneously off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation. Sealing of seams of overlapping adjacent roof membrane sheets, or overlap seams between flashing components and roof membrane sheets must be accomplished using hot air equipment specified by the membrane manufacturer for the specific membrane type, in strict compliance with roof membrane manufacturer's requirements and specifications. Width of membrane seams shall be not less than 1.5 inches regardless of seaming technique.
1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane. Following are guidelines for seam probing to identify cold welds, voids or other deficiencies:
   a. Allow seams to cool to ambient temperature before probing after approximately 30 minutes.
      1) Seams may be probed using tools such as a cotter key extractor that has been filled down, a blunted or dull awl or any round-tipped tool. Continuous probing will tend to sharpen the tip of the probe, so blunting the tip will need to be done on a regular basis.
   b. Draw the probing tool along the edge of the seam. Apply firm pressure to the seam, but not into the bottom membrane sheet. The tool will not penetrate the edge of a properly welded seam. Seams should be the specified width and free of voids.
   c. Mark deficiencies with a water-soluble marker.
   d. Probe repaired seams after they have cooled completely. If repair is acceptable, wipe off the marker.
2. Test Cuts
   a. On-site evaluation of welded seams shall be made daily by the Contractor to ensure membrane seam weld quality. One inch wide cross-section samples of welded-seams shall be taken at least three times per day. Test cuts shall be taken at each start-up of welding equipment, midpoint, and at each completion of the welding process. Correct welds display failure from shearing of the membrane prior to separation of the weld. Weld quality is essential. Adjust equipment settings as necessary to assure quality welds. Based on test cut findings, appropriate membrane seam remedies must be instituted. All membrane test cut locations shall be documented and membrane test cut samples shall be labeled and provided with the required daily construction reports.
   b. Test cuts or seam samples may not represent the overall membrane seam construction. If test can or seam samples indicate defects, further sampling must be performed to establish the scope of corrective action.
   c. Additional test cuts of suspect membrane seams shall be taken at the direction of the A/E or manufacturer's representative.
   d. Each test cut shall be patched by Contractor at no additional cost to the Owner.
3. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
4. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

5. Where 3 or more membrane sheets overlap, the T-joints shall be treated with a handheld hot air seaming tool, or other methods as approved by the roof membrane manufacturer to ensure continued seam integrity at this point.
6. Caution: Where solvents are used to clean membrane seams, ensure presence of adequate safety and first aid information. Instruct welding operator as to appropriate amounts of heat to be used. Excessive solvent/heat will cause damage to roof membrane and certain types of insulation material. Minimize solvent dispersion of top of roof membrane.
    a. Voltage fluctuations and climate conditions will affect the temperature of the heat welding equipment and subsequent quality of the seam. Contractor must take all necessary precautions to ensure seal quality. Contractor shall continuously monitor seam quality.

E. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

F. Install roofing membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and not to void warranty of existing roof system, if applicable.

3.10 BASE FLASHING INSTALLATION

A. General: All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of A/E and membrane manufacturer. Approval shall only be for specific locations and dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Contractor/Applicator's expense. Flashing shall be adhered to compatible dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

B. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
1. All flashing membranes should extend a minimum of 12 inches above roof level, unless otherwise noted. If in question, submit in writing (RFI) to A/E and membrane manufacturer's technical department for signed approval.

C. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

D. Flash penetrations and field-formed inside and outside corners with sheet flashing and hot-air weld into place.

E. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars, covered by counterflashing. Do not tightly butt the termination bars or cross expansion joints with a solid bar.

G. Flashing
1. Walls, Parapets, and Curbs:
    a. Secure deck membrane at angle change before bonding the membrane to the vertical surface. Membrane must be fully adhered to vertical surfaces.
    b. Secure flashing membrane with fasteners in horizontal rows for additional securement when flashing height exceeds 30 inches or as required by the roof membrane manufacturer.
    c. All wood nailers exposed to the interior of the building shall be enclosed with 24 gauge, aluminum-zinc alloy-coated sheet steel.
2. Metal Edge Terminations: Approved by ANSI/SPRI ES-1
    a. The width of the perimeter wood nailer to which the metal edge is to be secured shall extend beyond the width of the metal edge deck flange.
    b. Secure the metal edge to the wood nailer as specified by the manufacturer.

c. All perimeter wood nailers shall be totally concealed by extending the deck membrane to completely cover the nailers and extend past the bottom edge of the nailers a minimum of 3/4 inch.
d. Prior to flashing, scrub the metal edge deck flange and membrane with splice cleaner to remove field contaminants.

3. Expansion Joints:
   a. Secure the deck membrane on both sides of expansion joints with reinforced universal securement strip. Refer to expansion joint details for proper securement details.

4. Roof Drains:
   a. During the flashing operation, drain openings shall be protected against debris, etc. Prior to roofing activities, A/E,, and Roofing Contractor shall jointly review the roof drainage system to ensure proper drainage.
   b. Provide a smooth transition from the roof surface to the drain-clamping ring. Prepare the substrate around each roof drain to avoid membrane bridging (Minimum 12 inch) at the sump area and possible distortion at the drain clamping ring.
   c. The mating surfaces between the clamping ring and drain base shall be clean and have a smooth finish.
   d. Located field splices at roof drains at least 6 inches outside the drain sump.
   e. Cut the membrane so it extends approximately 1 inch beyond the attachment points of the drain damping ring.
      1) Under no circumstances shall the hole in the membrane restrict water flow or be smaller than the drain tube.
   f. The seal between the membrane and the drain base shall be provided using Water Cut-Off Mastic under compression.
   g. Remove all existing flashing, cement, and lead in preparation for the membrane seal (application of Water Cut-Off Mastic).
   h. All bolts and/or clamps shall be in place to provide compression on the Water Cut-Off Mastic.
   i. Upon completion of roofing activities, check drain pipe to ensure that drain line is free of obstruction. Any obstructions shall be removed.

5. Vent Pipes: Preformed flashing sleeves.
   a. Flash pipes with Molded Pipe Flashing where their installation is possible.
      1) Use stainless steel clamps to seal at top.
   b. Molded pipe flashing shall not be cut and patched; deck flanges shall not overlap or be installed over angle changes.
   c. Where Molded Pipe Flashing cannot be installed, apply field fabricated pipe seals using flashing sheet.
      1) Never use a wrap around detail or molded pipe flashing on a hot or warm penetration.

6. Penetration (Pipes, Conduits, etc.)
   a. Flash pipes with molded pipe flashing where their installation is possible.
      1) Use stainless steel clamps to seal at top.
      2) Mold pipe flashing shall not be cut and patched; deck flanges shall not overlap or be installed over angle changes.
      3) Where molded pipe flashing cannot be installed, apply field fabricated pipe seals using uncured flashing.
      4) Never use a wrap around detail or molded pipe flashing on a hot or warm penetration.
   b. Flexible penetration (electrical and braided cable, etc.): Pre-molded and filed-fabricated must not b installed around flexible pipes or conduits. Flexible penetrations must be installed in a sheet metal gooseneck or other boxed out structure.
   c. Penetration packets are required at the following locations:
      1) Rigid pipes with an outside diameter less than 1 inch.
      2) Clusters of pipes.
      3) Unusual shapes, e.g., structural beams, channels, or angles.

7. Mechanical Units and other Raised Curbs:
   a. Sheet metal counterflashing shall be installed to cover the top edge and overlap the upper portion of membrane base flashings unless the integral flange of the curb mounted with adequately covers the top of the membrane flashing.
      1) Provide a 4-inch coverage of roof flashings with counterflashings.

3.11 SNOW GUARD INSTALLATION

A. Provide snow guards (snow retention devices) per snow guard manufacturer's shop drawings along the bottom edge of all roof areas with simulated standing seam roof profile.
   1. Provide appropriate blocking or support ferrulle hardware for attachment of baseplate to roofing assembly as required to support loading and comply with performance requirements.
   2. Provide details avoiding discontinuing roof insulation over the interior of the building.
   3. Provide flashing patch, membrane in color to match field of roofing, as required to flash in snow guard base plate and assembly per roof manufacturer's installation details.

3.12 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
   1. Install walkways at all traffic concentration points such as roof hatches, access door, and roof top ladders.
   2. Install walkway one full width of flexible walkway around serviceable rooftop equipment.

3.13 SPLASH BLOCK INSTALLATION

A. Position protection sheet so that when splash block is set in place under downspout, sheet extends a minimum of between 3 and 6 inches beyond edges of splash block.

B. Adhere sheet to top surface of thermoplastic membrane roofing and hot air weld edges.

C. Set splash block as indicated under downspout.

3.14 DAILY WATERSTOP/TIE-INS

A. Provide waterstops/tie-in at all terminations of daily work.
   1. Remove embedded gravel/debris from surfaces.
   2. Width: 24 inches
   3. Adhere 12 inch or 18 inch wide membrane from exposed deck to existing roofing with a continuous application of tie-off mastic.
   4. Install "deadman" insulation filler at insulation staggers.
   5. Extend new roofing membrane at least 24 inches onto prepared area of adjacent existing roofing. Seal edge with 6 inch wide reinforcing membrane.
   6. Remove temporary connection at beginning of next workday by cutting membrane evenly along edge of existing roofing system. Remove "deadman" insulation fillers.

B. Temporary closures to ensure that moisture does not damage any complete section of the new roofing system are the responsibility of the roofing contractor. Completion of flashing, terminations, and temporary closures should be completed as required to provide a watertight condition. Any material contaminated by a temporary closure must be cut out and discarded prior to resumption of installation.

C. Measures shall be taken to ensure that water does not flow beneath the completed sections of the new membrane. Water cut-offs shall be provided on a daily basis and at the onset of inclement weather. Water cut-offs shall be removed prior to the resumption of work. The integrity of the water cut-offs is the responsibility of the roofing contractor. Any membrane contaminated by cut-off materials shall be removed before installation of the system continues.

3.15 FIELD QUALITY CONTROL

A. Inspection/Testing Agency: Owner will engage a qualified inspection and testing representative to inspect substrate conditions, surface preparation, workmanship, material storage, membrane application, flashings, protection, and drainage components, and to furnish reports to A/E through CM. Inspections shall also include but not be limited to the following:
   1. Inspection and testing representative will have the ability to recommend approval or rejection of work along with corrective measures required during the course of the Work.
   2. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   3. Notifying A/E, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   4. Submitting a certified written report of each test, inspection, and similar quality-control service to A/E, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected work.

B. Contractor or Manufacturer's Technical Representative shall photograph on-going construction during each day on-site. A minimum of 5 photographs shall be taken each day of on-site work ongoing, stored materials, special details, flashings, edge conditions and other activities documenting the installation of the roofing materials.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to A/E.
   1. Notify A/E 48 hours in advance of date and time of inspection.
   2. Owner's inspection representative, CM and A/E must be present at final inspection to obtain "Substantial Completion" of roof by Contractor.

D. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.16 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to A/E and Owner.
   1. Protect existing membrane roofing system and new roof areas where continued construction traffic is anticipated.
      a. Lay protection sheet or mat over existing membrane then loose lay 1-inch minimum thick, polyisocyanurate insulation over sheet or mat and cover with loosely laid plywood or OSB panels.
      b. Protection sheet or mat: Provide a sacrificial layer of matching membrane sheet extending a minimum 6 inches beyond insulation in all directions or a woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

B. Limit traffic and material storage to areas of roofing that have been protected.

C. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.17 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to inspect and maintain roofing system. Refer to Division 01 Section "Demonstration and Training."

B. Demonstration and Training: Provide a minimum of two hours of instruction, including but not limited to the following items:
   1. Review warranty requirements.
   2. Review Maintenance data.
   3. Review inspection procedures including:
      a. Where to look, e.g., roof access points, walkways, rooftop mechanical units, and litter.
      b. What to look for: cuts and punctures and compressed or crushed insulation.
      c. Remedial actions, emergency repair procedures.
      d. Preventative actions.

END OF SECTION 07 54 00

SECTION 07 81 00 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes sprayed fire-resistive materials (SFRM):
   1. Removal of existing sprayed fire-resistive material.

B. Related Sections include the following:
   1. Division 07 Section "Penetration Firestopping" for fire-resistance-rated firestopping systems.

1.3 DEFINITIONS

A. SFRM: Sprayed fire-resistive material.

B. Concealed: Fire-resistive materials applied to surfaces that are concealed from view behind other construction when the Work is completed and have not been defined as exposed.

C. Exposed: Fire-resistive materials applied to surfaces that are exposed to view when the Work is completed and that are identified as exposed on Drawings.

1.4 COORDINATION

A. Sequence and coordinate application of SFRM with other related work specified in other Sections to comply with the following requirements:
   1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
   2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
   3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
   4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
   5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
   6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
   7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
   8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including U.L. Design Listings from U.L. Inc.

B. Compatibility and Adhesion Test Reports: From SFRM manufacturer indicating the following:
   1. Materials have been tested for bond with substrates.
   2. Materials have been verified by SFRM manufacturer to be compatible with substrate primers and coatings.
   3. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.6 CLOSEOUT SUBMITTALS:

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals.
   1. Field quality-control test and special inspection reports.
   2. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by SFRM manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its SFRM to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
   1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
   2. Density: Test for density according to ASTM E605. Provide density indicate in referenced fire-resistance design, but not less than minimum specified in Part 2.
   3. Verify that manufacturer, through it own laboratory testing or field experience, attests that primers or coatings are compatible with sprayed fire-resistive material.
   4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, obtain sprayed fire-resistive material manufacturer’s written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire-resistance ratings applicable to Project.

B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.

C. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from Project site and discard wet or deteriorated materials.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not apply SFRM when ambient or substrate temperature is 40 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of SFRM, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.

C. Relative humidity shall not exceed amount published in fireproofing manufacturer's guidelines.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

C. Source Limitations: Obtain fire protection for each fire-resistance design from single source.

2.2 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire-Resistance Design: 1 hour rated, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. Asbestos: Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy".

2.3 SPRAYED FIRE-RESISTIVE MATERIALS

A. SFRM: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
   1. Products: Subject to compliance with requirements, provide one of the following as recommended by manufacturer for application indicated:
      a. AD Southwest Fireproofing Type 7GP, AD Southwest Fireproofing Type 7HD, Pyrocrete 40, Pyrocrete 239, Pyrocrete 240 High Yield, and Pyrocrete 241; Carboline Company, subsidiary of RPM International, Fireproofing Products Div.
      b. Monokote Z106, Monokote Z106/HY, and Retro-Guard; Grace, W. R. & Co. - Conn.; Grace Construction Products.
      c. Cafco Blaze-Shield II; Cafco 400, Fendolite M-II, and Fendolite TG. Isolatek International.
      d. Pyrok-HD and Pyrok-MD; Pyrok, Inc.
      e. Type 7GP and Type 7HD; Southwest Fireproofing Products Co.
   2. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
   3. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.

4. Density: Not less than 15 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E 605.
5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch.
6. Combustion Characteristics: ASTM E 136.
7. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index: 10 or less.
8. Compressive Strength: Minimum 10 lbf/sq. in. according to ASTM E 761.
9. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
10. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
12. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E 859.
13. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273.
14. Finish: Spray-textured finish.

2.4 AUXILIARY FIRE-RESISTIVE MATERIALS

A. General: Provide auxiliary fire-resistive materials that are compatible with SFRM and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: For use on each substrate and with each sprayed fire-resistive product, provide primer that complies with one or more of the following requirements:
   1. Primer's bond strength complies with requirements specified in UL's "Fire Resistance Directory" for coating materials based on a series of bond tests per ASTM E 736.
   2. Primer is identical to those used in assemblies tested for fire-test-response characteristics of SFRM per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive SFRM.
   1. Provide metal lath at applications over non-conforming or existing painted surfaces.

E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by manufacturer of SFRM.

F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by manufacturer of intumescent mastic coating fire-resistive material. Include pins and attachment.

G. Sealer for Sprayed-Fiber Fire-Resistive Material: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by manufacturer of sprayed-fiber fire-resistive material.
   1. Product: Subject to compliance with requirements, provide "Cafco Bond-Seal" by Isolatek International Corp.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of work. A substrate is in satisfactory condition if it complies with the following:
   1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
   2. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, incompatible paints, incompatible encapsulants, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
   3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
   4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.

B. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written reports, endorsed by Installer, listing conditions detrimental to performance of the work.

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

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
   1. Close off and seal ductwork in areas when fireproofing is being applied.

B. Remove existing sprayed fire-resistive materials from existing steel structure including all overspray of materials on adjacent steel floor deck and walls.

C. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, and incompatible primers, paints, and encapsulants.
   1. Work in accordance with SSPC guidelines SSPC-SP-1, SSPC-SP-2, SSPC-SP-3, or SSPC-SP-6 as appropriate to prepare substrate.

D. Seal all penetrations or open ended fireproofing termination by chamfering at a 45 degree angle and sealing with high heat silicone sealant.

E. Prime substrates where recommended in writing by SFRM manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive SFRM.
   1. Provide primer “cut back” 3 inches for bolted connections and 12 inches for welded connections.

F. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of SFRM. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION, GENERAL

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
   1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
   2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

D. Metal Decks:
   1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.

E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

F. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

G. Extend fireproofing in full thickness over entire area of each substrate to be protected.

H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fireproofing that differs in color from that of encapsulant over which it is applied.

J. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.

K. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

L. Cure fireproofing according to fireproofing manufacturer's written recommendations.

M. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

N. Finishes: Where indicated, apply fireproofing to produce the following finishes:
   1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instruction for each finish selected.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspection and prepare reports:
   1. Special inspections shall be based on the fire-resistance design as designated on the approved Contract Documents. Special inspections for sprayed fire-resistant materials applied to structural elements and decks shall be in accordance with the following:
      a. Structural Member Surface Conditions: The surfaces shall be prepared in accordance with the approved fire-resistance design and the approved manufacturer’s written instructions. The prepared surface of structural members to be sprayed shall be inspected before the application of the sprayed fire-resistant material.

b. Application: The substrate shall have a minimum ambient temperature before and after application as specified in the approved manufacturer's written instructions. The area for application shall be ventilated during and after application as required by the approved manufacturer's written instructions.

c. Thickness: The average thickness of the sprayed fire-resistant materials applied to structural elements shall not be less than the thickness required by the approved fire-resistant design. Individual measured thickness, which exceeds the thickness specified in a design by 1/4 inch or more, shall be recorded as the thickness specified in the design plus 1/4 inch. For design thicknesses 1 inch or greater, the minimum allowable individual thickness shall be the design thickness minus 1/4 inch. For design thicknesses less than 1 inch, the minimum allowable individual thickness shall be the design thickness minus 25 percent. Thickness shall be determined in accordance with ASTM E 605. Samples of the sprayed fire-resistant materials shall be selected in accordance with tests and inspections as noted herein.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

C. Tests and Inspections: Testing and inspecting of completed applications of SFRM shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of SFRM for the next area until test results for previously completed applications of SFRM show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.

1. Thickness for Floor, Roof, and Wall Assemblies: For each 1000-sq. ft. area, or partial area, on each floor, from the average of 4 measurements from a 144-sq. in. sample area, with sample width of not less than 6 inches per ASTM E 605.
2. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
3. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
4. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: For each 10,000-sq. ft. area, or partial area, on each floor, cohesion and adhesion from one sample of size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 736.
    a. Field test SFRM that is applied to flanges of wide-flange, structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
    b. If surfaces of structural steel receiving SFRM are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 150 lbf/sq. ft. minimum per ASTM E 736.
5. If testing finds applications of SFRM are not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.

D. Remove and replace applications of SFRM that do not pass tests and inspections for cohesion and adhesion, for density, or for both and retest as specified above.

E. Apply additional SFRM, per manufacturer's written instructions, where test results indicate that thickness does not comply with specified requirements, and retest as specified above.

3.5 CLEANING, PROTECTING, AND REPAIR

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect SFRM, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Substantial Completion.

C. Coordinate application of SFRM with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect SFRM and repair any damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07 81 00

SECTION 08 56 00 - SPECIAL FUNCTION WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes; Special function windows of the following types:
   1. Transaction (service) windows.

B. Related Sections:
   1. Division 08 Section “Glazing”.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for windows.

B. Shop Drawings:
   1. Include plans, elevations, sections, and attachments details.
   2. Full-size section details of framing members, including reinforcement and stiffeners.
   3. Location of weep holes.
   4. Sliding hardware for transaction windows.
   5. Glazing details.
   6. Details of transaction counter.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Pack windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.

B. Store crated windows on raised blocks to prevent moisture damage.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify transaction window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.6 SEQUENCING

A. Coordinate installation of anchorages for windows. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
   1. Creative Industries
   2. Ready Access Pass Thru Windows
   3. Quickserv Corp.
   4. Nissen and Company, Inc.
   5. C.R. Laurence Co., Inc.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 MATERIALS

A. Aluminum Extrusions: ASTM B 221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

D. Bituminous Paint: Cold-applied, asphalt mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30 mil thickness per coat.

2.3 WINDOW COMPONENTS

A. Glazing: Refer to Division 08 Section "Glazing".
   1. Type 4 laminated glazing.

B. Compression Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide compressible stripping for glazing and weather stripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

C. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers; and with a proven record of compatibility with surfaces contacted in installation.
   1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
   2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85 plus or minus 5.
   3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
   4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

D. Anchors, Clips, and Window Accessories: Stainless steel, hot dip zinc coated steel or iron complying with ASTM B 633; provide sufficient strength to withstand design pressure indicated.

2.4 HORIZONTAL-SLIDING, TRANSACTION WINDOWS (INTERIOR)

A. Basis of Design Product: C.R. Laurence Inc.: DW Series Manual Deluxe Sliding Service Window or a comparable product of one of the listed manufacturers.

B. Configuration: As indicated on Drawings.

C. Framing: Fabricate perimeter framing, mullions, and glazing stops from metal sheet as follows:
   1. Material: Extruded aluminum with Class I, clear anodized finish, unless otherwise noted.
   2. Profile: Manufacturer's standard with minimum face dimension indicated.
   3. Framing Depth:
      a. Manufacturer's standard.

D. Sliding Window Hardware: Provide roller track designed for overhead support of two or four wheel carriage supporting horizontal sliding glazed panel. Provide manufacturer's standard pull and lock for each horizontal sliding glazed panel.
   1. At Interior Locations: Provide half bottom track configuration.

2.5 FABRICATION

A. General: Fabricate windows to comply with indicated standards. Include a complete system for assembly of components and anchorage of windows.
   1. Provide windows that are reglazable from the secure side without dismantling the nonsecure side of framing.
   2. Prepare windows for glazing unless preglazing at the factory is indicated.

B. Framing: Miter or cope corners the full depth of framing, weld, and dress smooth.

C. Glazing Stops: Finish glazing stops to match window framing.
   1. Secure Side (Exterior) Glazing Stops: Welded or integral to framing.
   2. Nonsecure Side (Interior) Glazing Stops: Removable, coordinated with glazing indicated.

D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

F. Preglazed Fabrication: Preglaze windows at the factory where possible and practical for applications indicated.

G. Weather Stripping: Factory applied.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: Nonspecular as fabricated; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of transaction windows.
   1. Examine roughing in for embedded and built in anchors to verify actual locations of transaction window connections before transaction window installation.
   2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of transaction windows.

B. Inspect built in and cast in anchor installations, before installing transaction windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
   1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
   2. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

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

3.2 INSTALLATION

A. Fastening to In Place Construction: Provide anchorage devices and fasteners where necessary for securing transaction windows to in place construction. Include threaded fasteners for inserts, transaction fasteners, and other connectors.
   1. Provide acceptable fasteners for installation within storefront framing system.
   2. Coordinate with adjacent countertop installation for recessing of bottom track elements.

B. Sealants: Comply with requirements in Division 7 Section “Joint Sealants” for installing sealants, fillers, and gaskets.
   1. Seal frame perimeter with sealant to provide weathertight construction, unless otherwise indicated.

C. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.3 ADJUSTING

A. Adjust horizontal sliding transaction windows to provide a tight fit at contact points, for smooth operation and a secure enclosure.

B. Remove and replace defective work, including windows that are warped, bowed, or otherwise unacceptable.

3.4 CLEANING

A. Clean surfaces promptly after installation of transaction windows. Exercise care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
   1. Lubricate sliding window hardware.

B. Clean glass of preglazed transaction windows promptly after installation of transaction windows.

END OF SECTION 08 56 00

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General 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. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Automatic operators.
4. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.
3. Division 08 Section “Fiberglass Doors”,
4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
5. Division 28 Section “Access Control Hardware Devices”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. 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. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. 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.

E. 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.

F. 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.

1.4 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.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced 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 to manufacturer's instructions and recommendations and according to approved schedule.

1.5 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".

1.6 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 Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. 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.

1.7 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. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Ten years for extra heavy duty cylindrical (bored) locks and latches.
   2. Five years for exit hardware.
   3. Twenty five years for manual overhead door closer bodies.
   4. Five years for motorized electric latch retraction exit devices.
   5. Two years for electromechanical door hardware, unless noted otherwise.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified 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 the all out-swinging lockable doors.

5. Manufacturers:

   a. Hager Companies (HA).
   b. Ives (IV).
   c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - MacPro Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 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. Manufacturers:

   a. Hager Companies (HA).
   b. Ives (IV).
   c. Pemko (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Pemko (PE) - EL-CEPT Series.
    b. Securitron (SU) - EL-CEPT Series.
    c. Von Duprin (VD) - EPT-10 Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Manufacturers:

    a. Hager Companies (HA) - Quick Connect.
    b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC-C Series.
    c. Ives (IV) - CON Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

    a. Ives (IV).
    b. Rockwood (RO).
    c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls 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. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
    a. Ives (IV).
    b. Rockwood (RO).
    c. Trimco (TC).

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. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Manufacturers:
    a. Sargent Manufacturing (SA).
    b. Match Existing Keyway, Field Verify.
    c. No Substitution.

C. 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.

D. Removable Cores: Provide removable cores as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

E. 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.

F. 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).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. 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 MECHANICAL LOCKS AND LATCHING DEVICES

A. Tubular Locksets, Grade 1 (Extra Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.

1. Locksets to withstand 3000 inch pounds of torque applied to the locked lever without gaining access.

2. Locksets to fit a standard 2 1/8” bore without the use of through-bolts.

3. Lever handles to be made of solid material with no plastic fillers.

4. Latchbolt head to be one-piece stainless steel construction encased within the lock body.

5. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA A156.2 requirements to 34 million cycles.

6. Furnish with standard 2 3/4” backset and 1/2" throw latchbolt (3/4" at rated paired openings).

7. Manufacturers:

a. Sargent Manufacturing (SA) - 11 Line.
b. No Substitution.

2.7 ELECTROMECHANICAL LOCKING DEVICES

A. Electromechanical Cylindrical Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical cylindrical locksets, electrified locksets to be of type and design as specified below.

1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control and request-to-exit signaling. Unless otherwise indicated, provide electrified locksets standard as fail secure.

2. Manufacturers:

   a. Sargent Manufacturing (SA) - 10G70/71 Series.
   b. No Substitution.

2.8 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

   a. Sargent Manufacturing (SA) - 4870 Series.
   b. No Substitution.

2.9 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.

2.10 ELECTRIC STRIKES

A. Standard Electric Strikes: Electric strikes tested to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability with field selectable fail-secure/fail-safe. Where specified provide latchbolt monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Manufacturers:

   a. Adams Rite (AD).
   b. Folger Adam (FO).
   c. HES (HS).
   d. Von Duprin (VD).

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.11 CONVENTIONAL EXIT DEVICES

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

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

9. Rail Sizing: Provide exit device rails factory sized for proper door width application.

10. 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 panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 80 Series.
b. Von Duprin (VD) – 98/99 Series.
c. No Substitution.

2.12 ELECTROMECHANICAL EXIT DEVICES

A. Electromechanical Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices subject to same compliance standards and requirements as mechanical exit devices. Electrified exit devices to be of type and design as specified below and in the hardware sets.

1. Energy Efficient Design: Provide devices which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.

2. Where conventional power supplies are not sufficient, include any specific controllers required to provide the proper inrush current.

3. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.

4. Manufacturers:

a. Sargent Manufacturing (SA) - 80 Series.
b. Von Duprin (VD) – 98/99 Series.
c. No Substitution.

2.13 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 (Large Body Cast Iron): 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 body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:

a. LCN Closers (LC) - 4040XP Series.
b. Sargent Manufacturing (SA) - 281 Series.
c. No Substitution.

2.14 ELECTROHYDRAULIC DOOR OPERATORS

A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Standard: Certified ANSI/BHMA A156.19.

C. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.

F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. LCN Closers (LC) - 4640 Series.
2. Norton Rixson (NO) - 6000 Series.
3. Stanley Security Solutions (ST) - D-4990 Series.

2.15 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

   a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

   a. Ives (IV).
   b. Rockwood (RO).
   c. Trimco (TC).

2.16 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified 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. Ives (IV).
      b. Rockwood (RO).
      c. Trimco (TC).

C. 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 (RF).
      b. Glynn-Johnson (GJ).
      c. Rockwood (RO).
      d. Sargent Manufacturing (SA).

2.17 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 NPFA 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. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.18 ELECTRONIC ACCESSORIES

A. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.

1. Manufacturers:

a. Alarm Controls (AK) - TS Series.
b. Security Door Controls (SD) - 400 Series.
c. Securitron (SU) - PB Series.

B. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

1. Manufacturers:

a. Alarm Controls (AK) - SREX Series.
b. Security Door Controls (SD) - MD-31D Series.
c. Securitron (SU) - XMS Series.

C. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Security Door Controls (SD) - DPS Series.
b. Securitron (SU) - DPS Series.

D. Linear Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw plus 50% for the specified electrified hardware and access control equipment.

1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

2. Manufacturers:

a. Alarm Controls (AK) - APS Series.
b. Securitron (SU) - BPS Series.
c. Von Duprin (VD) - PS.

2.19 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.

2.20 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. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. 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.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. SU - Securitron
4. RO - Rockwood
5. OT - Other
6. SA - SARGENT
7. AD - Adams Rite
8. RF - Rixson
9. NO - Norton
10. AK - Alarm Controls

Hardware Sets

Set: 1.0

Doors: N041A

Description: Exterior Aluminum Egress Pair - Access Control Function x Auto-Unlock x Auto-Door x Remote Release

2	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
2	Electric Power Transfer	EL-CEPT		SU
1	Removable Mullion	L980S	PC	SA
1	Elec Rim Exit Device (DT/EL/RX/CD)	16 43 55 56 AD8510 EO	US32D	SA
1	Elec Rim Exit Device (NL/EL/LX/RX/CD)	16 43 53 55 56 64 AD8504 Less Pull	US32D	SA
2	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Conc Overhead Stop	6-336	630	RF
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Drop Plate	281D as req'd	EN	SA
1	Blade Stop Spacer	581 as req'd	EN	SA
1	Bracket	125V as req'd	EN	SA
1	Automatic Opener	6061 (D)	689	NO
1	Threshold	253x3AFG FHSL14SS		PE
1	Credential Reader	By Security Contractor		SA
2	ElectroLynx Harness - Frame	QC-C3000P		MK
2	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2	Position Switch	DPS2 - M / W-BK		SU
2	ADA Switch	505 (wall mount)		NO
1	Door Release Button	TS-18		AK
1	Power Supply	BPS (Size & Type as Required)		SU
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1	AiPhone / Intercom System	Match District Standard		OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader / remote release by intercom to retract latch, or manual key (active leaf) when locked.
Free egress at all times (both leafs).

Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress.
Auto-Door system must be integrated with electronic latching hardware on active door leaf.
Auto operation by ADA switches.
Exterior ADA switch is controlled by latch monitor (LX) feature in exit device and to operate only when latch is in retracted position.
Vestibule ADA switch will always trigger latch retraction for assisted egress when locked.
Coordinate with electrical and security contractors.
Auto-Door operator and overhead stop on active leaf.

Set: 2.0

Doors: N026A, N036B

Description: Exterior Aluminum Egress Pair - Access Control Function x Auto-Unlock

2	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
2	Electric Power Transfer	EL-CEPT		SU
1	Removable Mullion	L980S	PC	SA
1	Elec Rim Exit Device (NL/EL/RX/CD)	16 43 55 56 64 AD8504 Less Pull	US32D	SA
1	Elec Rim Exit Device (DT/EL/RX/CD)	16 43 55 56 AD8510 EO	US32D	SA
2	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
2	Door Closer w/ Stop	281 CPS	EN	SA
2	Drop Plate	281D as req'd	EN	SA
2	Blade Stop Spacer	581 as req'd	EN	SA
2	Bracket	125V as req'd	EN	SA
1	Threshold	253x3AFG FHSL14SS		PE
1	Credential Reader	By Security Contractor		SA
2	ElectroLynx Harness - Frame	QC-C3000P		MK
2	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2	Position Switch	DPS2 - M / W-BK		SU
1	Power Supply	BPS (Size & Type as Required)		SU
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader to retract latch or manual key (active leaf) when locked.

Free egress at all times (both leafs).
Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress.
Coordinate with electrical and security contractors.

Set: 3.0

Doors: N021A, N026B, N026C

Description: Exterior Aluminum Egress Pair - Keyed Entry Function x Auto-Unlock

2	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
2	Electric Power Transfer	EL-CEPT		SU
1	Removable Mullion	L980S	PC	SA
1	Elec Rim Exit Device (NL/EL/RX/CD)	16 43 55 56 64 AD8504 Less Pull	US32D	SA
1	Elec Rim Exit Device (DT/EL/RX/CD)	16 43 55 56 AD8510 EO	US32D	SA
2	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
2	Door Closer w/ Stop	281 CPS	EN	SA
2	Drop Plate	281D as req'd	EN	SA
2	Blade Stop Spacer	581 as req'd	EN	SA
2	Bracket	125V as req'd	EN	SA
1	Threshold	253x3AFG FHSL14SS		PE
2	ElectroLynx Harness - Frame	QC-C3000P		MK
2	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2	Position Switch	DPS2 - M / W-BK		SU
1	Power Supply	BPS (Size & Type as Required)		SU
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by manual key (active leaf) when locked. Free egress at all times (both leafs).
Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress.
Coordinate with electrical and security contractors.

Set: 4.0

Doors: N041B, N041C, N041D, N041E

Description: Exterior Aluminum - Reuse Existing Doors - Dummy Trim Function x Auto-Unlock Upgrade

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
2	Door Cord	TSB-C		SU
1	Existing Mullion	Existing Removable Mullion to Remain		OT
2	Elec Rim Exit Device (DT/EL/RX/CD)	16 43 55 56 AD8510 EO	US32D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Existing Pulls	Existing Push/Pull to Remain		OT
2	Existing Closers	Existing Closers to Remain		SA
1	Threshold	253x3AFG FHSL14SS		PE
2	ElectroLynx Harness - Frame	QC-C3000P		MK
2	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2	Position Switch	DPS2 - M / W-BK		SU
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
No entry when locked. Free egress at all times.
Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress. Coordinate with electrical and security contractors.

Set: 5.0

Doors: N037A-A

Description: Exterior FRP Egress - Access Control Function

1	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
1	Electric Power Transfer	EL-CEPT		SU
1	Elec Rim Exit Device (NL/EL/RX/CD)	16 55 56 64 8804 Less Pull	US32D	SA
1	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
1	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Drop Plate	281D as req'd	EN	SA

1	Blade Stop Spacer	581 as req'd	EN	SA
1	Bracket	125V as req'd	EN	SA
1	Credential Reader	By Security Contractor		SA
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
1	Position Switch	DPS2 - M / W-BK		SU
1	Power Supply	BPS (Size & Type as Required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader or manual key when locked. Free egress at all times.
Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinder.
Door position switch to monitor opening status. Exit device has integral RX feature to signal egress.
Coordinate with electrical and security contractors.

Set: 6.0

Doors: N041F

Description: interior Aluminum Egress Pair - Access Control Function x Auto-Unlock x Auto-Door x Remote Release

2	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
2	Electric Power Transfer	EL-CEPT		SU
1	Removable Mullion	L980S	PC	SA
1	Elec Rim Exit Device (DT/EL/RX/CD)	16 43 55 56 AD8510 EO	US32D	SA
1	Elec Rim Exit Device (NL/EL/LX/RX/CD)	16 43 53 55 56 64 AD8504 Less Pull	US32D	SA
2	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Conc Overhead Stop	6-336	630	RF
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Drop Plate	281D as req'd	EN	SA
1	Blade Stop Spacer	581 as req'd	EN	SA
1	Bracket	125V as req'd	EN	SA
1	Automatic Opener	6061 (D)	689	NO
1	Credential Reader	By Security Contractor		SA
2	ElectroLynx Harness - Frame	QC-C3000P		MK

2	ElectroLynx Harness - Door	QC-C___P x Length Required	MK
2	Position Switch	DPS2 - M / W-BK	SU
2	ADA Switch	505 (wall mount)	NO
1	Door Release Button	TS-18	AK
1	Power Supply	BPS (Size & Type as Required)	SU
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.	OT
1	AiPhone / Intercom System	Match District Standard	OT
1	Wiring Diagram	Elevation and Point to Point as Specified	OT

Notes:
Entry by valid input at reader / remote release by Reception to retract latch, or manual key (active leaf) when locked.
Free egress at all times (both leafs).
Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress.
Auto-Door system must be integrated with electronic latching hardware on active door leaf. Auto operation by ADA switches.
Vestibule ADA switch is controlled by latch monitor (LX) feature in exit device and to operate only when latch is in retracted position.
Interior ADA switch will always trigger latch retraction for assisted egress when locked.
Coordinate with electrical and security contractors.
Auto-Door operator and overhead stop on active leaf.

Set: 7.0

Doors: N013A, N026D, N027A, N039B, N103A, N109B

Description: Interior Aluminum Egress Pair - Access Control Function

2	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
2	Electric Power Transfer	EL-CEPT		SU
1	Removable Mullion	L980S	PC	SA
1	Elec Rim Exit Device (NL/EL/RX/CD)	16 43 55 56 64 AD8504 Less Pull	US32D	SA
1	Rim Exit Device (DT/RX/CD)	16 43 55 AD8510 EO	US32D	SA
2	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
2	Door Closer w/ Stop	281 CPS	EN	SA
2	Drop Plate	281D as req'd	EN	SA
2	Blade Stop Spacer	581 as req'd	EN	SA
2	Bracket	125V as req'd	EN	SA

1 Threshold	253x3AFG FHSL14SS		PE
1 Credential Reader	By Security Contractor		SA
2 ElectroLynx Harness - Frame	QC-C3000P		MK
2 ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2 Position Switch	DPS2 - M / W-BK		SU
1 Power Supply	BPS (Size & Type as Required)		SU
1 Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader to retract latch or manual key (active leaf) when locked.
Free egress at all times (both leafs).
Push / Pull operation as required by exit device dogging with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress.
Coordinate with electrical and security contractors.

Set: 8.0

Doors: G023A, G102A, N039A, N102A, N104A, N107A

Description: Interior Aluminum Egress Pair - Keyed Entry Function

2 Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1 Removable Mullion	L980S	PC	SA
1 Rim Exit Device (DT/CD)	16 43 AD8510 EO	US32D	SA
1 Rim Exit Device (NL/CD)	16 43 63 AD8504 Less Pull	US32D	SA
2 Permanent IC Core	6300 x District Keyway	US15	SA
1 Mullion Cylinder Kit	64 980C1	US26D	SA
2 Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2 Door Closer w/ Stop	281 CPS	EN	SA
2 Blade Stop Spacer	581 as req'd	EN	SA
2 Bracket	125V as req'd	EN	SA
1 Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT

Notes:
Entry by manual key when locked (active leaf). Free egress at all times (both leafs)
Push / Pull operation as required by exit device dogging with keyed lock cylinders.

Set: 9.0

Doors: G102B, N026E, N103B, N104B, N107B, N109A, N109C

Description: Interior Aluminum Egress Pair - Dummy Trimy Function

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Removable Mullion	L980S	PC	SA
2	Rim Exit Device (DT/CD)	16 43 AD8510 EO	US32D	SA
2	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Door Closer w/ Stop	281 CPS	EN	SA
2	Blade Stop Spacer	581 as req'd	EN	SA
2	Bracket	125V as req'd	EN	SA
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT

Notes:
Entry by manual key when locked (active leaf). Free egress at all times (both leafs).
Push / Pull operation as required by exit device dogging with keyed lock cylinders.

Set: 10.0

Doors: N041G, N041H, N041J, N041K

Description: Interior Aluminum - Reuse Existing Doors - Dummy Trim Function x Auto-Unlock Upgrade

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
2	Door Cord	TSB-C		SU
1	Existing Mullion	Existing Removable Mullion to Remain		OT
2	Elec Rim Exit Device (DT/EL/RX/CD)	16 43 55 56 AD8510 EO	US32D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Existing Pulls	Existing Push/Pull to Remain		OT
2	Existing Closers	Existing Closers to Remain		SA
2	ElectroLynx Harness - Frame	QC-C3000P		MK
2	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2	Position Switch	DPS2 - M / W-BK		SU
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
No entry when locked. Free egress at all times.
Push / Pull operation as required by electronic auto-unlock via access control system or mechanically with keyed lock cylinders.
Door position switches to monitor opening status. Exit devices have integral RX feature to signal egress. Coordinate with electrical and security contractors.

Set: 11.0

Doors: N043A

Description: Interior Aluminum - Access Control Function x Remote Release

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Paddle Operator	4590	628	AD
1	Deadlatch	4530	628	AD
1	Electric Strike (Flat Face)	7100 5 0 ELX	628	AD
1	Push Bar & Pull	BF15847 Mtg-Type 5HD/12XHD	US32D-316	RO
1	Credential Reader	By Security Contractor		SA
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	Position Switch	DPS2 - M / W-BK		SU
1	Door Release Button	TS-18		AK
1	Motion Sensor	XMS		SU
1	Power Supply	BPS (Size & Type as Required)		SU
1	Rectifier	4603		AD
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader, remote release by Reception or manual key. Free egress at all times. Door position switch to monitor opening status. Interior RX motion sensor to release to signal egress. Coordinate with electrical and security contractors.

Set: 12.0

Doors: N028C

Description: Interior Aluminum - Panic Egress - Keyed Entry Function

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Rim Exit Device (NL/CD)	16 43 63 AD8504 Less Pull	US32D	SA
1	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
1	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Drop Plate	281D as req'd	EN	SA
1	Blade Stop Spacer	581 as req'd	EN	SA
1	Bracket	125V as req'd	EN	SA
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT

Notes:

Entry by manual key when locked. Free egress at all times.
Push / Pull operation by exit device dogging with keyed lock cylinder.

Set: 13.0

Doors: G015A

Description: Interior Aluminum - Office Function

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Entry/Office Lock	CPC 28 63 11G05 LL	US26D	SA
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Drop Plate	281D as req'd	EN	SA
1	Blade Stop Spacer	581 as req'd	EN	SA
1	Bracket	125V as req'd	EN	SA
1	Door Stop	400 series as req'd	US26D	RO
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	Seals, Sweeps & Astragal	By Aluminum Door Mfr.		OT

Set: 14.0

Doors: N033A

Description: FRP Door - Access Control Function

1	Continuous Hinge	CFM__SLF-HD1 PT for door hgt		PE
1	Electric Power Transfer	EL-CEPT		SU
1	Fail Secure Lock	CPC RX 28 63 10G71 LL	US26D	SA
1	Door Closer	SRI TB 281 O/P!0 as req'd	EN	SA
1	Threshold	171AK FHSL14SS		PE
1	Silencers / Gasketing	By FRP Door Mfr.		PE
1	Sweep	308AV TKSP		PE
1	Credential Reader	By Security Contractor		SA
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
1	Position Switch	DPS2 - M / W-BK		SU
1	Power Supply	BPS (Size & Type as Required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader to release lever or manual key. Free egress at all times.
Door position switch to monitor opening status. Lockset has integral RX feature to signal egress.
Coordinate with electrical and security contractors.

Set: 15.0

Doors: N028A

Description: Access Control Function - Panic Egress

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Electric Power Transfer	EL-CEPT		SU
1	Elec Mortise Exit Device	43 63 8976 ETL	US32D	SA
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
3	Silencer	608-RKW		RO
1	Credential Reader	By Security Contractor		SA
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
1	Power Supply	BPS (Size & Type as Required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader to release lever trim or manual key. Free egress at all times. Coordinate with electrical and security contractors.

Set: 16.0

Doors: N009A

Description: Access Control Function Pair

6	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Electric Power Transfer	EL-CEPT		SU
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555 / 557 as req'd	US26D	RO
1	Fail Secure Lock	RX 28 63 10G71 LL	US26D	SA
2	Door Closer w/ Stop	281 CPS	EN	SA
1	Credential Reader	By Security Contractor		SA
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
2	Position Switch	DPS2 - M / W-BK		SU
1	Power Supply	BPS (Size & Type as Required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader to release lever or manual key (active leaf). Free egress at all times.
Door position switches to monitor opening status.
Coordinate with electrical and security contractors.

Set: 17.0

Doors: N006B, N008B, N017B, N019B

Description: Access Control Function x Closer w/ Stop

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Electric Power Transfer	EL-CEPT		SU
1	Fail Secure Lock	RX 28 63 10G71 LL	US26D	SA
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
3	Silencer	608-RKW		RO
1	Credential Reader	By Security Contractor		SA
1	ElectroLynx Harness - Frame	QC-C3000P		MK
1	ElectroLynx Harness - Door	QC-C___P x Length Required		MK
1	Power Supply	BPS (Size & Type as Required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Entry by valid input at reader to release lever trim or manual key. Free egress at all times.
Coordinate with electrical and security contractors.

Set: 18.0

Doors: N021D-A, N033A-A, N036A-A, N036B-A, N037B, N038A

Description: FRP Door - Storeroom Function

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Storeroom Lock	CPC 28 63 11G04 LL	US26D	SA
1	Door Stop	400 series as req'd	US26D	RO
1	Threshold	171AK FHSL14SS		PE
1	Silencers / Gasketing	By FRP Door Mfr.		PE
1	Sweep	308AV TKSP		PE

Set: 19.0

Doors: G020A, N110A
Description: FRP Door - Storeroom Function Pair x WS / OHS

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555 / 557 as req'd	US26D	RO
1	Storeroom Lock	CPC 28 63 11G04 LL	US26D	SA
1	Conc Overhead Stop	1-336	652	RF
2	Door Stop	400 series as req'd	US26D	RO
1	Threshold	171AK FHSL14SS		PE
1	Silencers / Gasketing	By FRP Door Mfr.		PE
2	Sweep	308AV TKSP		PE

Set: 20.0

Doors: N035A, N035B
Description: FRP Door - Storeroom Function Pair

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	555 / 557 as req'd	US26D	RO
1	Storeroom Lock	CPC 28 63 11G04 LL	US26D	SA
2	Door Stop	400 series as req'd	US26D	RO
1	Threshold	171AK FHSL14SS		PE
1	Silencers / Gasketing	By FRP Door Mfr.		PE
2	Sweep	308AV TKSP		PE

Set: 21.0

Doors: G019A, N037A
Description: FRP Door - Storeroom Function Pair

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	555 / 557 as req'd	US26D	RO
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
2	Door Stop	400 series as req'd	US26D	RO
1	Threshold	171AK FHSL14SS		PE
1	Silencers / Gasketing	By FRP Door Mfr.		PE
2	Sweep	308AV TKSP		PE
1	Edge Astragal	By FRP Door Mfr.		OT

Set: 22.0

Doors: N046A
Description: Storeroom Function x Closer - Fire Rated

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
1	Smoke Gasketing	S88		PE

Set: 23.0

Doors: N106B-A
Description: Storeroom Function x Closer w/ Stop

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Door Closer w/ Stop	281 CPS	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
3	Silencer	608-RKW		RO

Set: 24.0

Doors: N016A, N034A-A
Description: Storeroom Function x Closer

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 25.0

Doors: G004A
Description: Storeroom Function x Closer x HW Hinges

3	Hinge, Full Mortise, Hvy Wt	MPB68 (size per spec)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Door Closer	281 UO	EN	SA

1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 26.0

Doors: N005A, N023A, N106A-A
Description: Storeroom Function x Overhead Stop x Kickplate

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Conc Overhead Stop	1-336	652	RF
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
3	Silencer	608-RKW		RO

Set: 27.0

Doors: N101A, N106A, N108A
Description: Storeroom Function x Kickplate

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 28.0

Doors: N044A, N113A
Description: Storeroom Function

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Storeroom Lock	28 63 11G04 LL	US26D	SA
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 29.0

Doors: G017A
Description: FRP Door - Office Function

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Entry/Office Lock	28 63 11G05 LL	US26D	SA
1	Door Stop	400 series as req'd	US26D	RO

1	Silencers / Gasketing	By FRP Door Mfr.		PE

Set: 30.0

Doors: G105A, N034A, N112A
Description: Office Function x Closer

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Entry/Office Lock	28 63 11G05 LL	US26D	SA
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 31.0

Doors: N003C, N025C, N042A
Description: Office Function

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Entry/Office Lock	28 63 11G05 LL	US26D	SA
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 32.0

Doors: G111A, N021C-B, N037A-B
Description: FRP Door - Classroom Function Egress

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Mortise Exit Device, Classroom	CPC 43 63 8913 ETL	US32D	SA
1	Door Closer	SRI TB 281 O/P!0 as req'd	EN	SA
1	Door Stop	400 series as req'd	US26D	RO
1	Silencers / Gasketing	By FRP Door Mfr.		PE

Notes:
Entry by manual key when locked. Free egress at all times.
Lever trim can be locked / unlocked as required.

Set: 33.0

Doors: G021A

Description: FRP Door - Classroom Function Egress Pair

2	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Removable Mullion	L980A	US28	SA
2	Rim Exit Device, Classroom Security	CPC 43 49 63 8816 ETL	US32D	SA
1	Permanent IC Core	6300 x District Keyway	US15	SA
1	Mullion Cylinder Kit	64 980C1	US26D	SA
2	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA
2	Blade Stop Spacer	581 as req'd	EN	SA
2	Bracket	125V as req'd	EN	SA
2	Door Closer	SRI TB 281 O/P!0 as req'd	EN	SA
2	Door Stop	400 series as req'd	US26D	RO
1	Threshold	171AK FHSL14SS		PE
1	Silencers / Gasketing	By FRP Door Mfr.		PE
2	Sweep	308AV TKSP		PE

Notes:
Entry when by manual key when locked (both leafs). Free egress at all times.
Lever trim can be locked / unlocked from either side of door, with lock / unlock indicator on interior side.

Set: 34.0

Doors: N028B

Description: Classroom Function Egress

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Mortise Exit Device, Classroom	43 63 8913 ETL	US32D	SA
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Notes:
Entry by manual key when locked. Free egress at all times.
Lever trim can be locked / unlocked as required.

Set: 35.0

Doors: N028A-A, N028A-B

Description: Classroom Function x Closer x HW Hinges

3	Hinge, Full Mortise, Hvy Wt	MPB68 (size per spec)	US26D	MK
1	Classroom Lock	28 63 11G37 LL	US26D	SA
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 36.0

Doors: G004A-A, G004B-A
Description: Classroom Function x Overhead Stop

3	Hinge, Full Mortise	MPB79 (size per spec, NRP as req'd)	US26D	MK
1	Classroom Lock	28 63 11G37 LL	US26D	SA
1	Conc Overhead Stop	1-336	652	RF
3	Silencer	608-RKW		RO

Set: 37.0

Doors: N031A-A
Description: FRP Door - Privacy Function x Closer

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Privacy Lock	CPC 28 11U65 LL	US26D	SA
1	Blade Stop Spacer	581 as req'd	EN	SA
1	Bracket	125V as req'd	EN	SA
1	Door Closer	SRI TB 281 O/P!0 as req'd	EN	SA
1	Silencers / Gasketing	By FRP Door Mfr.		PE

Set: 38.0

Doors: N105A
Description: Privacy Function x Closer

3	Hinge, Full Mortise	MPB91 (size per spec)	US32D	MK
1	Privacy Lock	28 11U65 LL	US26D	SA
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 39.0

Doors: N004A, N024A
Description: Privacy Function

3	Hinge, Full Mortise	MPB91 (size per spec)	US32D	MK
1	Privacy Lock	28 11U65 LL	US26D	SA
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 40.0

Doors: N021C-A
Description: FRP Door - Passage Function Egress

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Mortise Exit Device, Passage	CPC 43 8915 ETL	US32D	SA
1	Door Closer	SRI TB 281 O/P!0 as req'd	EN	SA
1	Door Stop	400 series as req'd	US26D	RO
1	Silencers / Gasketing	By FRP Door Mfr.		PE

Notes:
Entry by manual key when locked. Free egress at all times.
Lever trim can be locked / unlocked as required.

Set: 41.0

Doors: N006A, N008A, N017A, N019A
Description: FRP Dors - Push / Pull Function - Lockable

1	Continuous Hinge	CFM__SLF-HD1 for door hgt		PE
1	Public Toilet Deadlock	CPC LB 63 4878	US26D	SA
1	Pull Plate	BF 126x70C CFTT/CFC as req'd	US32D	RO
1	Push Plate	70G 4" X 20" CFTT/CFC as req'd	US32D	RO
1	Door Closer	SRI TB 281 O/P!0 as req'd	EN	SA
1	Door Stop	400 series as req'd	US26D	RO
1	Silencers / Gasketing	By FRP Door Mfr.		PE

Set: 42.0

Doors: N031A, N032A
Description: Push / Pull Function

3	Hinge, Full Mortise	MPB91 (size per spec)	US32D	MK

1	Public Toilet Deadlock	CPC LB 63 4878	US26D	SA
1	Pull Plate	BF 126x70C CFTT/CFC as req'd	US32D	RO
1	Push Plate	70G 4" X 20" CFTT/CFC as req'd	US32D	RO
1	Door Closer	281 UO	EN	SA
1	Kick Plate	K1050 10" high BEV CSK	US32D	RO
1	Door Stop	400 series as req'd	US26D	RO
3	Silencer	608-RKW		RO

Set: 43.0

Doors: N006C, N019C, N043B, Display Case Doors
Description: Miscellaneous cores

1	Mortise Cylinder	63 40 series (length & cam as req'd)	US15	SA

Notes:
Verify lock cylinder requirements with door system manufacturers.

END OF SECTION 08 71 00

SECTION 08 87 23 – SAFETY AND SECURITY FILM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Window film (DFO):
   1. Privacy Window Film

1.3 REFERENCES

A. ASTM International (ASTM):
   1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
   2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
   3. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
   4. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
   5. ASTM D1044 - Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test).
   6. ASTM D2240 - Standard Method for Rubber Property - Durometer Hardness.
   7. ASTM D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
   8. ASTM D5895 - Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
   9. ASTM D4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
   10. ASTM E84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
   11. ASTM E903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
   12. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
   13. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
   14. ASTM F1642 - Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings.
   15. ASTM F2912 - Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings.

C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

D. Consumer Products Safety Commission 16 CFR, Part 1201 - Safety Standard for Architectural Glazing Materials.

E. GSA-TS01-2003 -- Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.

F. ISO 16933, International Standard for Glass in Building: Explosion-resistant security glazing - Test and classification for arena air-blast testing.

G. Underwriters Laboratories Inc. (UL): UL 972 - Burglary Resisting Glazing Material.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
   1. Provide documentation that the adhesive used on the specified film is a Pressure Sensitive Adhesive (PSA).

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
   1. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.
   2. Provide a commercial building reference list of 5 properties where the installer has applied window film. This list will include the following information:
      a. Name of building.
      b. The name and telephone number of a management contact.
      c. Type of glass.
      d. Type of film and/or film attachment system.
      e. Amount of film and/or film attachment system installed.
      f. Date of completion.
   3. Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Follow Manufacturer's instructions for storage and handling.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of any hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.8 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. At project closeout, provide to Owner’s Representative an executed current copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: 3M Commercial Solutions, which is located at: 3M Center Bldg. 220-12-E-04; St. Paul, MN 55144-1000; Toll Free Tel: 888-650-3497; Tel: 651-737-1081; Fax: 651 737 8241; FAX: 651-737-8241. Subject to compliance with requirements provide either the named product or a comparable product by one of the following manufacturers.
   1. Clear Safety and Security film: Saint-Gobain.
   2. LLumar Safety and Security Film; Eastman Performance Films.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for A/E's approval must be accompanied by the “Substitution Request Form” and complete technical data for evaluation. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 PERFORMANCE REQUIREMENT

A. Tear Resistance:
   1. Minimum Graves Area Tear Strength of 1,000 lbs% as measured on coated film product, without liner, per ASTM D1004.
   2. Minimum Graves Area Tear Strength of 1,200 lbs% as measured on coated film product, without liner, per ASTM D1004.
   3. Minimum Graves Area Tear Strength of 1,100 lbs% as measured on coated film product, without liner, per ASTM D1004.

B. Adhesion to Glass:
   4. Minimum 8 lbs/in peel strength per ASTM D3330 (Method A).
   5. Minimum 6 lbs/in peel strength per ASTM D3330 (Method A).
   6. Minimum 6 lbs/in peel strength per ASTM D3330 (Method A).
   7. Nominal 4 lbs/in peel strength per ASTM D3330 (Method A).
   8. Nominal 5 lbs/in peel strength per ASTM D3330 (Method A).
   9. Minimum 2 lbs/in peel strength per ASTM D3330 (Method A).
   10. Nominal 4 lbs/in peel strength per ASTM D3330 (Method A).
   11. Nominal 4 lbs/in peel strength per ASTM D3330 (Method A).
   12. Nominal 5 lbs/in peel strength per ASTM D3330 (Method A).
   13. Minimum 3 lbs/in peel strength per ASTM D3330 (Method A).
   14. Nominal 1 lbs/in peel strength per ASTM D3330 (Method A).

C. Flammability: Surface burning characteristics when tested in accordance ASTM E 84, demonstrating film applied to glass rated Class A for Interior Use:
   1. Flame Spread Index: no greater than 25.
   2. Smoke Developed Index: no greater than 55.

2.3 PRIVACY WINDOW FILM

A. Basis of Design: 3M “Affinity 15” providing high reflection to surface providing a mirror like appearance.
   1. Thickness: Manufacturer’s standard.
   2. Location: Interior of exterior and interior windows and where indicated on Drawings Mirror face shall face to exterior.

PART 3 EXECUTION

3.1 EXAMINATION

A. Film Examination:
   1. If preparation of glass surfaces is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
   2. Glass surfaces receiving new film should first be examined to verify that they are free from defects and imperfections, which will affect the final appearance.
   3. Do not proceed with installation until glass surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
   4. Commencement of installation constitutes acceptance of conditions.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Refer to Manufacturer's installation instructions for methods of preparation for Impact Protection Adhesive or Impact Protection Profile film attachment systems.

3.3 INSTALLATION

A. Film Installation:
   1. Install in accordance with manufacturer's instructions.
   2. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.
   3. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.
   4. Apply film to glass and lightly spray film with slip solution.
   5. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
   6. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
   7. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.4 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION 08 87 23

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings and acoustical ceiling clouds.

B. Related Sections include the following:
   1. Division 07 Section “Acoustical Joint Sealants” for general requirements.
   2. Division 09 Section “Gypsum Board Assemblies” for coordination and sound attenuation blankets.

C. Products installed, but not furnished, under this Section includes:
   1. Sound-attenuation blankets furnished under Division 09 Section “Gypsum Board Assemblies”.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

E. Pool Environment: The pool environment for special coatings, materials, and treatments includes the competition pool space, pool deck, pool equipment room, pool storage rooms, spectator seating areas and adjacent spaces within the same enclosure. Room numbers as follows: N013, N021, N021A, N022, N027, N029, N030, N035, N036, N036A, N036B, N037, N039, N102, N104, N107, N109, N201, N202, N203, N204, G023, G024, G102, and G103.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
   1. Ceiling clouds, as with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern, or possibly delay or accelerate the activation of the sprinkler of fire detection systems by channeling the heat from the fire either toward or away from the device.

B. Preinstallation Conference: Conduct conference at Project site.
   1. Agenda shall include project conditions, coordination with work of other trades, layout of items which penetrate ceilings.

C. Sequencing
   1. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generated activities and wet work have terminated, and overhead work is completed, tested, and approved.
   2. Install acoustic units after interior wet work is dry.

3. Ensure that products of this Section are supplied to affected trades in time to prevent interruption of construction progress.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including:
   1. Preparation instructions and recommendations.
   2. Dimensions, load carrying capacity, and performance standards compliance.
   3. Storage and handling requirements and recommendations.
   4. Installation and maintenance instructions.

B. Color samples: Submit Manufacturer's full line of color options for specified materials.
   1. Metal ceilings

C. Tile Samples: Do not submit.

1.6 CLOSEOUT SUBMITTALS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Maintenance Data: For finishes to include in maintenance manuals.
   2. Receipt of extra materials.

1.7 EXTRA (MAINTENANCE) MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
   2. Hold-Down Clips: Equal to 2 percent of quantity installed.

B. Replacement Stock: In addition to the maintenance stock specified above, provide extra replacement stock of acoustical materials, consisting of a minimum of one percent of area of each size, type, and thickness installed on the job. This extra stock is for replacement of damaged materials during the 60-day period following Substantial Completion, when the Owner's agent cannot ascertain the party responsible for the damage. Replacement stock that is not used shall be furnished to the Owner as extra materials.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain acoustical panel ceiling and suspension system from one source from a single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   1. Acoustical Tile Products
      a. Armstrong World Industries
      b. USG Interior Systems
      c. CertainTeed Ceilings
      d. National Gypsum
      e. Rockfon
   2. Suspension System Products
      a. Armstrong World Industries
      b. Chicago Metallic Corporation/Rockfon
      c. USG Interior Systems
      d. CertainTeed Ceilings
   3. Trim and Accessories
      a. Armstrong World Industries
      b. USG Interior Systems
      c. Chicago Metallic Corporation/Rockfon
      d. Gordon, Inc.
      e. Fry Reglet Corporation
      f. MM Systems, Inc.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The “Substitution Request Form” and complete technical data for evaluation must accompany requests for A/E’s approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Panels shall meet the following minimum performance criteria:
   1. ASTM E1264, Class A materials.
   2. Moisture Resistant: No visible sag at of 90-percent relative humidity and 104 degrees F.

B. Kitchens and associated rooms (storage, locker, and toilet) excluding classrooms and halls require aluminum, aluminum faced galvanized steel or stainless steel grid and lay-in panels with smooth, unperforated vinyl, polyester film (Mylar), or similar surface.

C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
   1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
      a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
      b. Identify materials with appropriate markings of applicable testing and inspecting agency.
   2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
      a. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance's, unless otherwise indicated.
   1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
   1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by A/E from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Panel Characteristics: Comply with "Acoustical Ceiling Product Schedule" at the end of this section and additional information included in the "List of Finishes".

D. Humidity Resistance: Where indicated in "Acoustical Panel Ceiling Product Schedule," panels shall be dimensionally stable at up to 100 percent relative humidity at temperatures ranging from 32 to 104 deg F. without having to acclimatize tiles.

E. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
   1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
   1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
      a. Type: Cast-in-place, postinstalled expansion, or postinstalled bonded anchors.
      b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition, unless otherwise noted.
      c. Where high-humidity finishes are specified, provide one of the following:
         1) Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
         2) Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
         3) Location: Pool environment area and adjacent support areas.
   2. Power-Actuated Fasteners in Concrete: Not allowed.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper, unless otherwise noted.

a. Where high-humidity finishes are specified, provide one of the following:
1) Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
a) Monel Alloy 400 Wire, 12 gauge minimum.
2) Location: Pool environment area and adjacent support areas.

2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch diameter wire.

3. At clouds provide the following installation hardware items to conceal/minimize hangers (installation kit):
a. Strong Backs: Hot dipped galvanized cold rolled steel, caring channel, cut length to accommodate installation of cable 24 inches from edge of cloud.
b. Cable Hardware: 2-1/16 inches by 1 inch by 3/8 inch quick loop where clamp for 1/16 inch diameter cable.
1) Hardware shall be capable of supporting 200 lbs.
c. Cable: 7 by 7 aircraft cable, 1/16 inch by 120 inch galvanized with loop at one end.
d. At Swimming pool environment area and adjacent areas within or connected to the same environment provide above materials in stainless steel or Nickel Copper-Alloy materials.
1) Monel Alloy 400 Wire, 12 gauge minimum.

E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
1. At Swimming pool environment area and adjacent areas within or connected to the same environment provide above materials in stainless steel or Nickel Copper-Alloy materials.

F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch thick, galvanized steel sheet complying with ASTM A 653, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.

G. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.
1. Provide at the following locations and where indicated:
a. ACT located in vestibules, toilet rooms, and locker rooms.
b. ACT in fire rated installations, where panels weigh less than 1 pound/sq.ft.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation, with prefinished 15/16-inch wide metal caps on flanges.
1. Structural Classification: Intermediate duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Steel or aluminum cold-rolled sheet.
5. Cap Finish: Painted white, unless otherwise noted.
6. Provide this suspension system unless otherwise noted.
7. Provide manufacturer’s similar suspension system components with specific modifications for specialty Torsion Spring type ceiling panels.

B. Wide-Face, Capped, Double-Web, Aluminum Suspension System: Main and cross runners roll formed from aluminum according to ASTM A C635, with prefinished, 15/16-inch wide, aluminum caps on flanges.
1. Structural Classification: Light duty system.
2. Face Design: Flat, flush.
3. Cap Material: Aluminum.
4. Face Finish: Painted white, unless otherwise noted.
a. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

5. Provide this suspension system with ACT Type(s) 5 and 9.
    a. Location: Pool environment, adjacent support spaces, and locker rooms.
6. Provide high-humidity accessory materials indicated herein with this assembly.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
4. Provide radiused corner edge moulding trim at bullnose block.

B. Suspension (Perimeter) Trim: 4 inch wide face, 9/16-inch horizontal legs with hems formed for attachment to the mounting clip; commercial quality cold-rolled 24-gauge steel, factory finished in based enamel paint finish, on all exposed surfaces.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
    a. Axiom Trims and Transitions; Armstrong World Industries.
    b. Compasso Standard; USG Interior Systems.
    c. Cloud Perimeter Trim; CertainTeed Ceilings.
    d. Infinity; Rockfon.
2. Splice Plate: Steel in finish to match trim pans; formed for snap-fit into pan ends.
3. Attachment Clips: Hot-dipped galvanized steel in finish to match pans formed for snap-fit into pan and attached to suspension system members.
    a. Provide stainless steel attachment clips in pool environment areas.
4. Corner Trim Pieces: To match trim.
5. Trim shall be straight and/or curved as indicated.
6. Color: Match adjacent suspension system.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Division 07 Section “Acoustical Joint Sealants”.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide one of the following:
    a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
    b. Grabber Construction Products; Acoustical Sealant GSC.
    c. Pecora Corporation; AC-20 FTR or AIS-919.
    d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
    e. USG Corporation; SHEETROCK Acoustical Sealant.
    f. GE Construction Sealants; RCS20 Acoustical
    g. Henkel Corp.; OSI Pro-Series SC-175 Acoustical Sound Sealant.
    h. Serious Energy Inc.,: Quiet Seal Pro.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the Project Conditions.

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

C. Refer to Room Finish Schedule, Legend and Reflected Ceiling Plan for spaces to receive acoustical ceiling tile. Grid shall be laid out and coordinated for lighting fixtures and mechanical system items. Furnish layouts for anchors, clips, and other ceiling anchors whose installation is specified in other Sections.

D. The installation of the ceiling shall be done prior to the installation of shelving, built-in counters, and finished floors; but after the other work in the room has been completed, including painting, unless otherwise approved by the A/E.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install suspension wires 4 foot on center, maximum in both directions. For lighting fixtures install hanger wires to runners at all 4 corners of fixtures.
   2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   3. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   4. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   5. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
   6. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structures.

7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, that extend through forms into concrete.
    a. Powder-actuated fasteners are not allowed.
8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
9. Do not attach hangers to steel deck tabs.
10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
11. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
12. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications and so deflection does not exeed 1/360 of the span.

C. Install clouds in accordance with the manufacturer's instructions and in compliance with authorities with jurisdiction.
1. Review the location of the "strongback" carrying channels. Locate 2 foot from longest side of the cloud and 4 foot on center.
2. Hanging cables shall be plumb, located along the length of the "strongback" carrying channel starting 1 foot from the end (2 foot from the edges of the cloud) and then 4 foot on centers (note that in some instances this pattern will result in two hanging cables being positioned 2 foot from one another at the center of the cloud).
    a. Install supplemental suspension members and hangers in the form of trapeze or equivalent devices as required so as not to splay hangers. Hangers shall be plumb.
    b. Cables shall be fitted with a loop at one end that is cinched to mounting hardware appropriated for the surface to which it is attached. Select hardware that will be capable of supporting a minimum of 200 lbs.
3. Install mains and tees in accordance with manufacturer's requirements.
4. Install trim as indicated and in accordance with manufacturer's requirements.
    a. Suspension (perimeter) trim shall be braced 24 inches on center.

D. Secure bracing wires, if required by authorities, with jurisdiction, to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

F. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

G. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
    a. As indicated on reflected ceiling plans.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer, if edges are not concealed by suspension system flanges.

4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
5. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
6. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 ACOUSTICAL PANEL CEILING PRODUCT SCHEDULE

A. Acoustical Panel Ceilings.
1. ACT Type 1: Perforated aluminum torsion spring type panels in 2D and 3D shapes, ASTM E 1264.
   a. Aluminum thickness: 0.040 inches.
   b. Class A, per ASTM E84
   c. Thickness: 1-1/2 inch for 2D panel. Varies for 3D panel.
   d. Finish: Factory applied polyester paint.
   e. Refer to List of Finishes for shape, size, perforations, color, and additional information.
   f. Products:
      1) Metalworks, Torsion Spring Shapes by Armstrong.
      2) CertainTeed, matching product.
      3) USG Interiors, matching product.
      4) Rockfon, matching product.
2. ACT Type 2 and 10: Fiberglass or Mineral Fiber/CAC with mineral fiber and foil backing, ASTM E 1264, Type XII or Type IV, Form 2, Pattern E or G, 24 by 24 by 1 inch, square tegular, 15/16 inch grid, with NRC of 0.90-1.00, CAC of 26-30, Class A, humidity sag resistant, light reflectance of 0.80 minimum and <1 pound/sq.ft. Acoustically transparent membrane with factory applied acrylic latex paint, color - white, unless otherwise noted.
   a. Products: Subject to compliance with requirements, provide one of the following products specified:
      1) Item No. 3354, Optima; Armstrong.
      2) 1342B -IOF-1F, Symphony F: Foil Back; CertainTeed.
      3) Item No. 88225, Halcyon Climaplus or Mars High-NRC 88138; USG Interiors.
3. ACT Type 3: Wet formed, mineral fiber, ASTM E 1264, Type III, Form 2, Pattern CE, 24 by 24 by 3/4 inch, square lay-in, 15/16 inch grid, with NRC of 0.65-0.70, CAC of 35 minimum, humidity sag resistant, light reflectance of 0.78 minimum and >1 pound/sq.ft. Factory applied vinyl latex paint, color - white, unless otherwise noted.
   a. Products: Subject to compliance with requirements, provide one of the following products specified:
      1) Item No. 1713, School Zone Fine Fissured; Armstrong.
      2) HHF-457 HNRC, Fine Fissured High NRC; CertainTeed.
      3) Item No. 22421, Radar Education Climaplus High NRC; USG Interiors.
      4) No. 600, Artic; Rockfon.
4. ACT Type 4: Perforated aluminum torsion spring type flat panels, ASTM E 1264.
   a. Aluminum thickness: 0.040 inches. Provide 0.060 inch thickness as required by size of panels.
   b. Class A, per ASTM E84
   c. Thickness: 1-1/2 inch.
   d. Finish: Factory applied polyester paint.

e. Cut panels as required for recessed devices and provide manufacturer's standard opening trim.
f. Refer to List of Finishes for shape, size, perforations, color, and additional information.
g. Products:
1) Metalworks, Torsion Spring Interior by Armstrong.
2) CertainTeed, matching product.
3) USG Interiors, matching product.
4) Rockfon, matching product.

B. Restrooms, Locker Rooms, Multi-Purpose Room, Low Ceiling Areas and Corridors (Damage Resistant)
1. ACT Type 5: Wet formed, high density mineral fiber, ASTM E 1264, Type III, Form 2, Pattern CE, 24 by 24 by 5/8 inch, square lay-in, 15/16 inch grid, with NRC of 0.40-0.60, CAC of 30-40, Class A, antimicrobial treatment, humidity sag resistant, impact and scratch resistant, light reflectance of 0.80 minimum. Factory applied vinyl latex paint with scuff resistant spatter coat, color - white, unless otherwise noted.
a. Products: Subject to compliance with requirements, provide one of the following products specified:
1) Item No. 301, Tundra; Armstrong.
2) Item FFSB-157, School Board; CertainTeed.
3) Item No. 5893, Touchstone Climaplus; USG Interiors.
4) No. 600 Artic; Rockfon.

C. Kitchen/Food Prep/Laboratories: Provide one of the following:
1. ACT Type 7: Wet formed, mineral fiber, ASTM E 1264, Type IX, Form 2, Pattern G, 24 by 24 by 1/2 inch to 5/8 – 3/4 inch, square lay-in, 15/16 inch grid, with NRC of 0.00-0.10, CAC of 21-40, antimicrobial treatment, humidity sag resistant, soil resistant, and light reflectance of 0.80 minimum and $\leq$ 1 pound/sq.ft. Factory painted latex paint, white, unless otherwise noted. USDA approved.
a. Products: Subject to compliance with requirements, provide one of the following products specified:
1) Item No. 673, Kitchen Zone; Armstrong.
2) 1142-CRF-1, Vinylrock, Non-Perf; CertainTeed.
3) Item No. 56091, Clean Room ClimaPlus or Item No. 3270, Sheet Lay-in Ceiling Tile ClimaPlus; USG Interiors.
4) No. 31101 Hygienic Plus; Rockfon.

D. Pools/Shower Rooms: Provide one of the following:
1. ACT Type 9: ASTM E 1264, Type XX, (high density with scrubbable finish), Pattern C, 24 by 24 by 1/2 inch to 5/8 inch, square lay-in, 15/16 inch grid, with NRC of 0.55, CAC of 30-40, scrubbable, soil resistant, light reflectance of 0.80 minimum. Scrubbable factory applied vinyl plastic paint, color - white, unless otherwise noted.
a. Products: Subject to compliance with requirements, provide one of the following products specified:
1) Item No. 607, Fine Fissured (Ceramaguard); Armstrong.
2) Aquarock, CertainTeed.
3) Ceramic Climaplus; USG Interiors.
4) Eurostone; Chicago Metallic.
5) Koral; Rockfon.

E. Specialty:
1. ACT Type 6: Refer to Division 09 Section "Linear Metal Ceilings".
2. ACT Type 8 (Accent Canopies): Basis of Design "Shapes Alta, 400.12" by 3Form.
a. Material: 1/4 inch thick engineered co-polyester resin heat formed into shape with sealed edges. Class B rated.
1) 3Form "Varia Ecoresin"
b. Shapes: Two standard shapes in manufacturer's size and profile.
1) Pre-drill holes in panels for mounting.
c. Color and Pattern/Interlayer: Refer to "List of Finishes"

d. Installation: Suspended with Manufacturer's standard suspension installation kit utilizing socket cup, bottom release, 1/16 inch aircraft cable, cable coupler, and fasteners. Provide cable of sufficient length to mount panels at heights and angles indicated on Drawings. Provide fasteners appropriate for substrate for attaching components. Manufacturer's standard fasteners may not be sufficient. Comply with Manufacturer's written installation instructions.

e. Provide supplemental steel framing in form of slotted metal channel framing (Unistrut) in size required to span between structural steel beams, support the panels and be connected to the steel beams. Provide additional fire treated wood blocking attached to the slotted metal channel framing if required for attachment of panel hadware.

END OF SECTION 09 51 13

SECTION 09 54 23 - LINEAR METAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes strip linear metal pans and suspension systems for ceilings (ACT 6).
   1. Review "Finish Schedule," Architectural, Mechanical, and Electrical Drawings for type of material, layout, and pattern of linear metal ceiling units, location of recessed light fixtures, ceiling diffusers and grilles, details of suspension system, details at change of level, details at ceiling penetrations, special edge treatment, and necessary connections to work of other trades.

B. Related Sections:
   1. Division 09 Section "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
   2. Divisions 21, 23, and 26 Sections for light fixtures, sprinklers, and air-distribution components.

1.3 DEFINITIONS

A. LR: Light Reflectance coefficient.

B. NRC: Noise Reduction Coefficient.

C. Pool Environment: The pool environment for special coatings, materials, and treatments includes the competition pool space, pool deck, pool equipment room, pool storage rooms, spectator seating areas and adjacent spaces within the same enclosure. Room numbers as follows: N013, N021, N021A, N022, N027, N029, N030, N035, N036, N036A, N036B, N037, N039, N102, N104, N107, N109, N201, N202, N203, N204, G023, G024, G102, and G103.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination
   1. Coordinate layout and installation of linear metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

B. Preinstallation Meeting
   1. Preinstallation Meeting: Conduct meeting at Project site.

1.5 ACTION SUBMITTALS

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

B. Shop Drawings: For linear metal ceilings.
   1. Include reflected ceiling plans, sections and details drawn to scale, showing the following:
      a. Linear ceiling patterns and joints.
      b. Ceiling suspension members.
      c. Method of attaching hangers to building structure and locations of cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

d. Ceiling-mounted items including, but not limited to, light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
e. Ceiling perimeter and penetrations through ceiling; trim and moldings.

C. Samples for Initial Selection: For components with factory-applied color and other decorative finishes.

1.6 CLOSEOUT SUBMITTALS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
1. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Linear Metal Ceiling Components: Quantity of each pan, carrier, accessory, and exposed molding and trim equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. Provide suspension system components produced by a single manufacturer to provide compatible components for a complete metal ceiling system installation.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver linear metal pans, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle linear metal pans, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install linear metal ceilings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the materials and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specifications Department at least 10 days prior to bid due date.

2.2 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

B. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials, as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

2.3 LINEAR METAL CEILING

A. Pans and Suspension System:
1. Basis of Design: CertainTeed, 300C Linear Plank
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Armstrong Ceiling & Wall Solutions
b. Hunter Douglas Architectural Products, Inc.
c. Rockfon (Rockwool International)
d. USG Corporation
e. American Decorative Ceilings (ADC)

B. Metal Pans: Complying with ASTM E1264 for and formed to snap on to carriers securely, without separate fasteners.
1. Surface-Burning Characteristics: For metal-pan assemblies, including backings, determined by testing in accordance with ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 50 or less.
2. Metal: Aluminum sheet, ASTM B209, alloy and temper recommended by producer and finisher for type of use and finish indicated.
3. Form: Perforated.
a. Perforation Pattern: As indicated by manufacturer’s designation. Pattern #160.
4. Noise Reduction Coefficient (NRC) Rating: Not less than 0.95 when tested in accordance with ASTM C423.
5. Backing: Manufacturer's standard to provide NRC rating indicated for perforation pattern indicated.
a. 1-inch-thick glass fiber, 1.5 lb/cu. ft. density, enclosed in black polyethylene.
6. Pan Thickness: Not less than 0.028 inch.
7. Pan Edge Detail: Beveled.
8. Pan Width: 12 inch nominal.
9. Pan Depth: Manufacturer’s standard. .
10. Metal-Pan Finish: Protected on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping and as follows:
a. Color-Coated Finish: Manufacturer's standard powder-coat baked paint finish complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
1) Color and Pattern: As selected by Architect from manufacturer's full range.
11. Overall shape: Curved sections in cloud configuration.

C. Pan Splices: Formed for snap fit into butt-cut pan.
1. Finish: Matching pan.

D. End Caps: Manufacturer's standard material fabricated to fit and conceal exposed ends of pans.
   1. Finish: Matching pan.

E. Moldings and Trim: Manufacturer's standard for exposed members, to conceal edges of penetrations through ceiling, to conceal ends of pans and carriers, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching linear metal pans or extruded plastic unless otherwise indicated.
   1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

F. Suspension (Perimeter) Trim: 4 inch wide face, 9/16-inch horizontal legs with hems formed for attachment to the mounting clip; commercial quality cold-rolled 24-gauge steel, factory finished in based enamel paint finish, on all exposed surfaces.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
      a. Axiom Trims and Transitions; Armstrong World Industries.
      b. Compasso Standard; USG Interior Systems.
      c. Cloud Perimeter Trim; CertainTeed Ceilings.
      d. Infinity; Rockfon.
   2. Splice Plate: Steel in finish to match trim pans; formed for snap-fit into pan ends.
   3. Attachment Clips: Hot-dipped galvanized steel in finish to match pans formed for snap-fit into pan and attached to suspension system members.
      a. Provide stainless steel attachment clips in pool environment areas.
   4. Corner Trim Pieces: To match trim.
   5. Trim shall be straight and/or curved as indicated.
   6. Color: Match adjacent suspension system.

G. Carrier Suspension System: Manufacturer's standard complying with requirements in ASTM C635/C635M for applications indicated; complete with carriers, splice sections, stabilizing components, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.
   1. Material: ASTM B209 (ASTM B209M) aluminum.
   2. Flexible Radial Carriers: Manufacturer's standard radial carriers.
   3. Expansion Carriers: Manufacturer's standard carriers allowing for irregularities or other unusual space conditions.
   4. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers.
   5. Carrier Splices: Same metal, profile, and finish as for carriers.
   6. Hold-Down Clips: Manufacturer's standard hold-down clips spaced as standard with manufacturer.
   7. Suspension System shall be flat and curved to follow shapes and profile indicated.

2.4 CARRIER-SYSTEM HANGERS, BRACES, AND TIES

A. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated.

B. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper, unless otherwise noted.
      a. Where high-humidity finishes are specified, provide one of the following:
         1) Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
            a) Monel Alloy 400 Wire, 12 gauge minimum.
         2) Location: Pool environment area and adjacent support areas.
   2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch diameter wire.

3. At clouds provide the following installation hardware items to conceal/minimize hangers (installation kit):
    a. Strong Backs: Hot dipped galvanized cold rolled steel, caring channel, cut length to accommodate installation of cable 24 inches from edge of cloud.
    b. Cable Hardware: 2-1/16 inches by 1 inch by 3/8 inch quick loop where clamp for 1/16 inch diameter cable.
        1) Hardware shall be capable of supporting 200 lbs.
    c. Cable: 7 by 7 aircraft cable, 1/16 inch by 120 inch galvanized with loop at one end.
    d. At Swimming pool environment area and adjacent areas within or connected to the same environment provide above materials in stainless steel or Nickel Copper-Alloy materials.
        1) Monel Alloy 400 Wire, 12 gauge minimum.

C. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
    1. At Swimming pool environment area and adjacent areas within or connected to the same environment provide above materials in stainless steel or Nickel Copper-Alloy materials.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed from 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653, G90 (Z275) coating designation; with bolted connections and 5/16-inch diameter bolts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which linear metal ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of linear metal ceilings.

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

3.2 PREPARATION

A. Measure each ceiling area and establish layout of linear metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width or -length pans at borders, and comply with layout shown on reflected ceiling plans and Coordination Drawings.

3.3 INSTALLATION

A. Comply with ASTM C 636, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
    1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
    2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
    3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
    4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate to which hangers are attached and for type of hanger involved.

5. Secure angle hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, that extend through forms into concrete. Do not use power-actuated fasteners.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers but without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of linear metal ceiling area and where necessary to conceal edges and ends of linear metal pans.
1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system carriers so they are aligned and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Cut linear metal pans for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

G. Install linear metal pans in coordination with suspension system and exposed moldings and trim.
1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
3. Install pans with butt joints using internal pan splices and in the following joint configuration:
   a. Staggered a minimum of 12 inches.
4. Where metal pan ends are visible, install end caps unless trim is indicated.
5. Install sound-absorbent pads at right angle to perforated metal pans so pads do not hang unsupported.

3.4 CLEANING

A. Clean exposed surfaces of linear metal ceilings, including trim and edge moldings after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 09 54 23

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Solid vinyl floor tile.
      a. Luxury Vinyl Tile (LVT).
   2. Rubber floor tile (RFT).

B. Related Sections:
   1. Division 03 Section “Cast-in-Place Concrete” for vapor retarder.
   2. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Before resilient tile installation, conduct a conference at Project site to review mock-ups, joint locations, transitions, installation methods, and pattern layouts. A/E will schedule and conduct meeting.
   1. Flooring manufacturer shall have a representative at the Preinstallation conference.

1.4 ACTION SUBMITTALS

A. Shop Drawing: Show installation details, overall pattern of different colors, borders, transitions and seams.

B. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.5 CLOSEOUT SUBMITTALS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Maintenance Data: For each type of floor tile to include in maintenance manuals.
   2. Receipt for extra materials.

1.6 MAINTENANCE MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Manufacturers Qualifications: Flooring product manufacturer will have a technical installation representative available at the job site at the inception of the installation to insure there are no conditions which will compromise the installation of the material and that the material is being installed according to industry standards, practices and manufacturers guidelines. The manufacturer’s technical representative will document and confirm that the substrate, material, and installation are in compliance with manufacturer’s guidelines and accepted industry standards and practices.

1. Any noticed defect with the product or installation system will require the response of the manufacturer's technical field service personnel on site to determine cause, correction or replacement.

B. Installer's Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation method.

C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups for floor tile including accessories.
a. Size: First-in-place 100 sq. ft. for each type, color, and pattern shall serve as mockup.
1) Perform bond testing on mockup.
2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockups, unless A/E specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work, if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
1. 48 hours (minimum) before installation.
2. During installation.
3. 48 hours after installation.

B. Maintain the ambient relative humidity between 40 and 60 percent during installation.

C. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

D. Close spaces to traffic during floor tile installation.

E. Close spaces to traffic for 48 hours after floor tile installation.

F. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.
   1. Where products are indicated on List of Finishes with colors selected, provide sample to verify color match with substitution request.

C. Source Limitations: Obtain resilient tile flooring of same standard, class and type from one manufacturing plant to minimize size variations. Flooring from one manufacturer but separate plants is not acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by a qualified testing agency by testing identical products.
   1. Critical Radiant Flux Classification (ASTM E 648 or NFPA 253): Class I (not less than 0.45 watts per cm^2).
   2. Smoke Generation (ASTM E 662 or NFPA 258): Maximum specific optical density of 450 or less.

B. Accessibility: Flooring shall comply with accessibility requirements of the U.S. Architectural and Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1 as required by local authorities with jurisdiction.
   1. Comply with ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring: Exceeds Federal Standards and ADA requirements for slip-resistance.

2.3 SOLID VINYL FLOOR TILE (SVT)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified in "List of Finishes":
   1. Luxury Vinyl Tile (LVT):
      a. Composite construction built with a solid homogeneous calendared layers reinforced with non-woven glass fiber combined with a polymeric base and heavy commercial wearlayer.

B. Tile Standard: ASTM F 1700.
   1. Class: Class I monolithic vinyl tile and Class III, printed film vinyl tile.
   2. Type: Type A, smooth surface and Type B, embossed surface.

C. Thickness: 6.0 mm
   1. Wear Layer: 28 mil, where indicated by product in "List of Finishes".

D. Applied Finish: Manufacturer's, factory-applied, permanent, UV-cured.
   1. Polyurethane surface treatment.

E. Size: As indicated in "List of Finishes".

F. Seaming Method: Standard.

G. Colors and Patterns: As indicated in "List of Finishes".

2.4 RUBBER FLOOR TILE (RFT)

A. Products: Subject to compliance with requirements, provide products by one of the manufacturers specified in "List of Finishes":

B. Tile Standard: ASTM F 1344, Class I-A, homogeneous rubber tile, solid color, unless otherwise indicated by product designations in “List of Finishes”.

C. Hardness: Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240.

D. Thickness: 0.125 inch.

E. Size: As designated in “List of Finishes”.

F. Colors and Patterns: As selected by A/E from full range of industry colors.

2.5 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated and coordinate with substrate. Note: A primer may be required.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
   1. Coverage: Full-surface application
   2. Adhesives shall be approved by manufacturer for use over concrete substrates with maximum RH of 95 percent (ASTM F2170) and maximum pH of 9.
   3. If Resilient Tile Flooring manufacturer does not have moisture/water resistant adhesive for the relative humidity values, provide adhesives as specified in Division 09 Section “Moisture Resistant/Water-Proof Flooring Adhesive for Concrete Slabs”.

2.6 SOURCE QUALITY CONTROL

A. Manufacturer Services: Manufacturer assures the product submitted is appropriate for the application and environment in which it is to be installed and that the product is merchantable for service, free of visible and latent defects and will perform for the purpose for which it is intended without compromise.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, curing compounds, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected and manufacturer has approved substrate for material to be installed without compromise.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
   1. Bond Test: An adhesive bond test must be performed using the actual flooring materials and adhesive to be installed. The tests area must be a minimum of 36 by 36 inches and remain in place for at least 72 hours and then evaluated for bond strength to the substrate.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
      a. Mechanically remove contamination of the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
      a. A pH test for alkalinity must be conducted. Results should range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the problem has been corrected.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours, unless otherwise noted in manufacturers printed literature.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 85 percent relative humidity level measurement.
      c. Moisture testing shall be performed at least 60 days in advance of flooring installation to allow sufficient drying time for levels acceptable to floor manufacturer. Refer to Division 01 Section “Temporary Facilities and Controls.”

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
   1. Underlayment shall be steel troweled smooth and trowel marks showing through installed tile shall be reason to remove the tile and sand out trowel marks.
   2. Provide skim coat of trowelable leveling and patching compound over entire surface scheduled to receive resilient tile flooring.

D. Floor covering shall not be installed over expansion joints.

E. Do not install floor tiles until they are same temperature as space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
   1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using manufacturer recommended method for materials and substrate indicated. Produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
   1. Tiles should be lightly butted together when placing the flooring into adhesive.
   2. Do not force tiles together creating a ledge condition at the seams and corners. Sliding tiles will result in forcing the adhesive out between the seams.
   3. Periodically, lift the corner of an installed tile to ensure proper transfer of adhesive.
   4. Roll floor in both directions with a 100 pound three-section roller. Use a small hand roller in areas that cannot be reached with a large roller.
   5. Roll the flooring in both directions using a 100 pound three-section roller.
   6. Inspect the floor surface, especially seams, and remove any adhesive on the surface.
   7. Install adhesive as recommended for the site conditions and follow adhesive label for proper use.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   1. No traffic for 24 hours after installation.
   2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

D. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and application of high-performance coating systems (HPC) on the following substrates:
   1. Exterior Substrates:
      a. Concrete, vertical surfaces.
      b. Galvanized Steel.
   2. Interior Substrates:
      a. Concrete, vertical and horizontal surfaces.
      b. Concrete masonry units (CMU).
      c. Steel.
      d. Galvanized metal.
      e. Gypsum board.
      f. Plaster.
      g. Aluminum Ductwork

B. Related Sections include the following:
   1. Division 05 Sections for shop priming of metal substrates.
   2. Division 09 painting Sections for special-use coatings and general field painting.

1.3 DEFINITIONS

A. Standard coating terms defined in ASTM D 16 apply to this Section.

B. Gloss ranges used in this Section include the following:
   1. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter. (MPI value similar to G5).
   2. High gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter. (MPI values similar to G6 and G7).

C. Pool Environment: The pool environment for special coatings, materials, and treatments includes the competition pool space, pool deck, pool equipment room, pool storage rooms, spectator seating areas and adjacent spaces within the same enclosure. Room numbers as follows: N013, N021, N021A, N022, N027, N029, N030, N035, N036, N036A, N036B, N037, N039, N102, N104, N107, N109, N201, N202, N203, N204, G023, G024, G102, and G103.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

B. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

1.5 CLOSEOUT SUBMITTALS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Receipt of extra materials.

1.6 QUALITY ASSURANCE

A. Master Painters Institute (MPI) Standards:
   1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
   2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and coating systems indicated.

B. Mockups: Apply benchmark samples of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. A/E will select one surface to represent surfaces and conditions for application of each type of coating and substrate.
      a. CMU Wall and Steel structure Ceiling Surfaces: Provide samples of at least 100 sq. ft.
      b. Other Items: A/E will designate items or areas required.
   2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
   3. Final approval of color selections will be based on benchmark samples.
      a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by A/E at no added cost to Owner.
   4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
   5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Paint Manufacturer’s representative shall make the following quality assurance site visits to observe preparation and painting operations. Cost for Manufacturer’s representative’s time shall be included in the cost of this Work.
   1. Preinstallation Conference.
   2. After preparation of new materials and before new coating is applied.
   3. After delivery of high performance factory primed components
   4. After initial priming operations and before any topcoat is applied.
   5. Periodic review during application of topcoat.
   6. Upon completion of final topcoat to review entire installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
   1. Name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.
   8. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
   1. Quantity: Furnish an additional 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers on the current “MPI Approved Product List”.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The “Substitution Request Form” and complete technical data for evaluation must accompany requests for A/E’s approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.
   1. Indicate reason for not being on the MPI “Approved Products List” with submittal.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL (HPC)

A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."

B. Material Compatibility:
   1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
   3. Provide products of same manufacturer for each coat in a coating system.

C. Colors: Refer to “List of Finishes”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Masonry (Clay and CMU): 12 percent.
      c. Gypsum Board: 12 percent.

B. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   1. Coating application indicates acceptance of surfaces and conditions.

E. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.
   1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
      a. Confirmation of primer's suitability for expected service conditions.
      b. Confirmation of primer's ability to be top coated with materials specified.
   2. Notify A/E about anticipated problems before using the coatings specified over substrates primed by others.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
   1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Schedule cleaning and coating application so dust and other contaminates from cleaning process will not fall on wet, newly coated surfaces.
   2. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   1. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
   2. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   1. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi at 6 to 12 inches.

F. CMU Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

G. Steel Substrates: Remove rust and loose mill scale.
   1. Clean using methods recommended in writing by coating manufacturer, but not less than the following:
      a. SSPC-SP6/NACE No. 3, "Commercial Blast Cleaning."
   2. Other types of preparation as noted in the Coating Schedule.

H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA1 for touching up shop-primed surfaces.

I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
   1. Other types of preparation as noted in the Coating Schedule.
   2. Surface preparation should start with SSPC SP-1 Solvent Cleaning to remove oil/grease contamination. If galvanized surface is shinney, surface must be de-glossed and roughened in one of two ways:
      a. In mild building environments, wash with a chemical etching solution such as MPI #25.
      b. In aggressive environments (Natatoriums), where practical, brush-off abrasive blasting (SSPC-SP7b). Blasting at lower pressures (50 psi) and/or with softer abrasives (sponge, corncobs, walnut shells, etc) can produce a suitable surface profile while minimizing damage to underlying zinc.
   3. Galvanized metals are very smooth and have virtually no profile for coating to adhere to. It is important to abrade surface of galvanized metal through Brush of Blast (SSPC SP7), or an etching primer before coatings application, as recommended by paint manufacturer.
   4. Galvanized surfaces must use a primer before applying a topcoat. Topcoats will not adhere to zinc layer of galvanized surface and requires a primer to form a bond between two. Manufacturer's water-based bonding primers as an alternative to previously used cementitious primers. An epoxy primer may also be used, however, it should be noted that epoxy primers typically require an abrasive blast-cleaned surface.

J. Gypsum Wallboard: Must be clean and dry. Fill nail heads must be set and spackled. Joints must be taped and covered with joint compound. Spackled nail heads and taped joints must be sanded smooth and all dust removed prior to painting.
   1. Vacuum wall with brush attachment.
      a. As wall is vacuumed, wipe if down with microfiber cloth. Piles of dust may accumulate near base. Be sure to vacuum this dust before you begin to paint; otherwise, it could become airborne and ruin your smoothly painted wall.
   2. Wipe down wall with microfiber cloth.
   3. Gently wash walls.
      a. Apply water sparingly. Let wall dry thoroughly before painting.
   4. Repeat steps until all traces of dust are removed.

K. Existing Painted Surfaces:
   1. In accordance with good painting practice, all surface and absorbed contaminants (i.e., dirt, dust, grease, oil, mildew, moisture, chemical fall-out, etc.) shall be removed prior to applying any new coat of paint, since performance and adhesion of the new coat is directly proportional to the cleanliness of the substrate.
   2. Abrade existing painted surfaces to achieve surface texture for adhesion of primers and new painting systems.
      a. Refer to Surface-Preparation Schedule herein for additional information.
      b. Determine abrasion technique and materials based on existing substrates and existing paint types.
   3. Removal of old painting system prior to the application of a new coat of paint shall not be required unless adhesion problems between the existing coating and new proposed coating cannot be eliminated.
      a. New coating shall be compatible with existing coating based on previous testing of coating products for adhesion by manufacturer and on installer's field experience.
      b. A test patch shall be used when previous testing does not exist or is unacceptable to A/E.
      c. The preparation of substrates does not apply to previously coated surfaces that contain lead. These surfaces require special preparation. Contractor shall refer to recommendations of paint manufacturer for preparation requirements.
   4. Extra preparation work will be required (regardless of condition) on existing semi-gloss, alkyd enamel surfaces.

5. Existing metal surfaces with alkyd enamel (hollow metal doors, frames and other ferrous metals): Abrade and sand all surfaces of existing alkyd paint to achieve rough texture profile ready for new paint adhesion. New primer must be utilized on existing metal surfaces.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions.
   1. Use applicators and techniques suited for coating and substrate indicated.
   2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
   1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
   2. Testing agency will perform tests for compliance with specified requirements.
   3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

B. Dry Film Thickness Testing: Owner reserves the right to engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
   1. Contractor shall touch up and restore coated surfaces damaged by testing.
   2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by A/E, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Galvanzied Steel Substrates:
1. Epoxy/Epoxy/Polyurethane system: (Code #5.311).
a. Prime Coat: Primed as part of work for Division 05 Section "Structural Steel Framing".
b. Intermediate Coat: Tnemec Series N69, Hi-Build Epoxoline at 2.0 to 3.0 mils d.f.t.
c. Topcoat: Tnemec Series 1094 Endura-Shield at 3.0 to 4.0 mils d.f.t., gloss.
d. Applications include, but is not limited to:
1) Exposed structural steel columns or beams.
2) Exposed decorative steel at canopies.
e. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

B. Concrete Vertical & Horizontal Surfaces: (Code #3.111)
1. Water-Based, Light-Industrial Coating System:
a. Coating: Alkali resistant, water based.
1) PPG; Perma Crete 100% Acrylic High Build Interior/Exterior Flat, 4-22XI Series
a) 100 % Acrylic
b) Comply with ASTM D6904-3 for wind driven rain.
2) Sherwin Williams: Loxon Concrete and Masonry Primer/Sealer and ConFlex XL Smooth High Build Acrylic Coating (2 coats of topcoat).
3) Benjamin Moore
4) Provide 2 coats. Minimum 7 to 13 wet mils each coat.
a) All holes, cracks, voids and other surface blemishes must be filled as a result of coating application.
b. Application includes, but is not limited to:
1) Existing concrete surfaces, existing concrete masonry unit surfaces and new pre-cast concrete wall panels.
2) Vertical, horizontal and all sides/surfaces of open waffle slab cells.
c. Refer to additional cleaning and preparation requirements related to these surfaces within this Specification.

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Refer to Definitions within this Section for extent of "pool environment" spaces.

B. Concrete Substrates, Vertical Surfaces:
1. Water-Based HDP Acrylic Polymer (Code 3.114)
a. Prime Coat: Waterborne Cementitious Acrylic.
1) Fill all voids and provide a smooth pin hole free surface
2) Tnemec Series 130, Envirofill
b. Intermediate Coat: Water-based HDP pure acrylic polymer applied to DFT 2.0-3.0 mils.
1) Tnemec Series 1029, Enduratone
c. Topcoat: Water-based HDP pure acrylic polymer applied to DFT 2.0-3.0 mils.
1) Tnemec Series 1029, Enduratone
d. Application: New vertical and horizontal concrete surfaces in pool environment areas.
1) Concrete and exposed vertical concrete.
2) Exposed portions of concrete seating riser assembly.

e. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

C. CMU Substrates:
1. Epoxy Coating System: (Code #4.222).
a. Prime Coat: Epoxy block filler.
1) Sherwin Williams; Cement-Plex 875 Acrylic Block Filler or DuraPlate 2300
2) PPG; Amerlock 400BF
b. Intermediate Coat: Epoxy, gloss.
c. Topcoat: Epoxy, gloss.
1) Sherwin Williams; Pro Industrial Hi Performance Epoxy
2) PPG; Amerlock 2 VOC
d. Application includes, but is not limited to:
1) Wet environments where additional abrasion resistance is required, e.g. showers.
2. Water-Based Epoxy Coating System: (Code #4.224).
a. Prime Coat: Interior/exterior latex block filler.
1) Sherwin Williams; Pro Industrial Heavy Duty Block Filler
2) PPG; 6-15XI Speedhide Hi-Fill Block Filler
b. Intermediate Coat: Water-based epoxy (interior), semi-gloss.
c. Topcoat: Water-based epoxy (interior), semi-gloss.
1) Sherwin Williams; Pro Industrial Pre-Catalyzed Epoxy
2) PPG; 16-510 Pitt-Glaze WB1 Pre-Catalyzed Epoxy
d. Application includes, but is not limited to:
1) Dry environments additional abrasion-resistance is required (for example, toilet rooms, locker rooms).
3. Water-Based HDP Acrylic Polymer (Code 4.225)
a. Prime Coat: Waterborne Cementitious Acrylic.
1) Fill all voids and provide a smooth pin hole free surface
2) Tnemec Series 130, Envirofill
b. Intermediate Coat: Water-based HDP pure acrylic polymer applied to DFT 2.0-3.0 mils.
1) Tnemec Series 1029, Enduratone
c. Topcoat: Water-based HDP pure acrylic polymer applied to DFT 2.0-3.0 mils.
1) Tnemec Series 1029, Enduratone
d. Applications: CMU substrates in pool environment areas.
e. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

D. Steel Substrates:
1. W.B. Light Industrial Coating System; (Code #5.222).
a. Prime Coat:
1) Sherwin Williams; Pro-Cryl Universal Primer
2) PPG; 90-712 Pitt-Tech DTM Primer
b. Intermediate Coat: W.B. Light Industrial Coating, semi-gloss.
c. Topcoat: W.B. Light Industrial Coating, semi-gloss.
1) Sherwin Williams; Pro Industrial Pre-Catalyzed Epoxy
2) PPG; 16-510 Pitt-Glaze WB1 Pre-Catalyzed Epoxy
d. Application includes, but is not limited to:
1) Columns, beams, joist, etc.
2. W.B. Light Industrial Coating System: (Code #5.223).
a. Prime Coat:
1) Sherwin Williams: Pro-Cryl Universal Primer
2) PPG: 90-712 Pitt-Tech DTM Primer
b. Intermediate Coat: W.B. Light Industrial Coating, gloss.

c. Topcoat: W.B. Light Industrial Coating, gloss.
1) Sherwin Williams: Pro Industrial WB Urethane Alykd.
2) PPG: Aquacron 200 HR
d. Application includes, but is not limited to:
1) Stair stringers and exposed steel portions of stair assemblies.

3. High-Build Coating System: (Code #5.224).
a. Prime Coat: Epoxy zinc primer, Tnemec Series 90-97 by Structural Steel Fabricator
b. Intermediate Coat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
c. Topcoat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
d. Application includes, but is not limited to:
1) New metal and steel surfaces, steel joists, beams, columns, exposed metal framing within pool environment areas.
e. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

4. High-Build Coating System: (Code #5.225).
a. Preparation: SSPC-SP3 – Power Tool Cleaning.
b. Prime Coat: Modified Polyamidoamine Epoxy applied to 4.0 to 6.0 mils DFT.
1) Tnemec Series 135.
c. Intermediate Coat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
d. Topcoat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
e. Application includes, but is not limited to:
1) Miscellaneous steel framing members, connections or supports not factory primed by Structural steel fabricator located within the pool environment areas. This includes but is not limited to connection angles, clips, exposed ductwork, hangers, supports and other ferrous metal items exposed in spaces.
f. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

5. High-Build Coating System: (Code #5.227).
a. Preparation: SSPC-SP3 – Power Tool Cleaning.
b. Spot Prime Coat: Modified Polyamidoamine Epoxy applied to 4.0 to 6.0 mils DFT.
1) Tnemec Series 135.
2) Any areas of rust or surface blemishes.
c. Intermediate Coat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
d. Topcoat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
e. Application includes, but is not limited to:
1) Existing painted structural steel and steel deck in existing pool area.
2) Existing painted miscellaneous steel in existing pool area.
f. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

E. Galvanized-Metal Substrates:
1. W.B. Light Industrial Coating System: (Code #5.322)
a. Prime Coat: primer.
1) Note: Primer maybe omitted on recommendations by manufacturer.
2) Sherwin Williams; Pro-Cryl Universal Primer
3) PPG; 90-712 Pitt-Tech DTM Primer
b. Intermediate Coat: W.B. Light Industrial Coating, semi-gloss.

c. Topcoat: W.B. Light Industrial Coating, semi-gloss.
1) Sherwin Williams: Pro Industrial Waterborne Urethane
2) PPG: Aquacron 200 HR
d. Application includes, but is not limited to:
1) High contact traffic areas (doors, frames, pipes, etc.).
2) Low contact/low traffic areas (overhead decking, pipes, ducts, etc.).

2. W.B. Light Industrial Coating System: (Code #5.323)
a. Prime Coat: primer.
1) Sherwin Williams; Pro-Cryl Universal Primer
2) PPG; 4020 Pitt-Tech Plus DTM Primer
b. Intermediate Coat: W.B. Light Industrial Coating, semi-gloss.
c. Topcoat: W.B. Light Industrial Coating, semi-gloss.
1) Sherwin Williams: Equal
2) PPG: PSX One, single component acrylic polysiloxane.
d. Application.
1) Galvanized railings and guardrails.
2) Ships Ladder assembly (interior)

3. High-Build Coating System: (Code #5.321).
a. Prime Coat: Polyamide epoxy applied at deck fabricator, Tnemec Series 161.
b. Intermediate Coat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
c. Topcoat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
d. Application includes, but is not limited to:
1) New galvanized metal deck within pool environment areas.
2) Galvanized metal surfaces within swimming pool environment.
e. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

F. Gypsum Board and Plaster Substrates:
1. Water-Based Epoxy Coating System: (Code 9.211).
a. Prime Coat: Interior latex primer/sealer.
1) Sherwin Williams; ProMar 200 Zero VOC Interior Latex Primer
2) PPG; 6-2 Speedhide Quick Drying Latex Sealer
b. Intermediate Coat: Water-based epoxy (interior and exterior).
c. Topcoat: Water-based epoxy (interior and exterior)(semi-gloss)
1) Sherwin Williams; Pro Industrial Pre-Catalyzed Epoxy
2) PPG; 16-1510 Pitt-Glaze WB1 Pre-Catalyzed Epoxy
d. Application includes, but is not limited to:
1) High traffic areas where frequent cleaning with detergent and industrial cleaners is likely to occur e.g. toilet room.

G. Aluminum Ductwork:
1. Water based epoxy coating system (Code 10.12)
a. Preparation: The surface shall be sanded or chemically treated prior to any coating application and solvent wiped.
b. Prime Coat: Polyamidoamine epoxy applied to 3.0 – 4.0 DFT
1) Tnemec Series N69
c. Intermediate Coat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
d. Topcoat: Hydrophobic Acrylic; 3.0 to 4.0 mils DFT.
1) Tnemec Series 115
e. Application: Aluminum ductwork and hangers within pool environment.
f. Acceptable additional Manufacturer's:
1) Carboline
2) PPG Protective and Marine Coatings
3) Sherwin Williams Protective and Marine Coatings

END OF SECTION 09 96 00

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes following:
   1. Public-use washroom accessories.
   2. Public-use shower room accessories.
   3. Warm-air dryers.
   4. Childcare/special needs accessories.
   5. Custodial accessories.

B. Owner-Furnished and Contractor Installed Material: Soap dispenser, paper towel dispensers, and toilet paper dispensers.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include following:
   1. Construction detail, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Electrical characteristics.
   4. Features that will be included for Project.
   5. Manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS:

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Maintenance Data: For toilet and bath accessories to include in maintenance manuals; including replacement parts information.
   2. Warranty: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Accessibility Requirements: Comply with requirements applicable in jurisdiction of project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.
   1. Where bottoms of units are between 27 and 80 inches above finished floor, accessories mounted on or in wall cannot protrude more than 4 inches into a clear access aisle..

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect

1.8 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements: Comply with requirements applicable in jurisdiction of project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.
   1. Where bottoms of units are between 27 and 80 inches above finished floor, accessories mounted on or in wall cannot protrude more than 4 inches into a clear access aisle.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   1. Hand/Hair Dryers: Certified to Underwriters Laboratories (UL); bear UL or ETL markings.

C. Structural Performance: Accessories and fasteners to comply with the following requirements:
   1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
   2. Shower Seats: Installed units are able to resist 250 lbf applied in any direction and at any point.

2.2 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed material requirements and functional qualities of specified product. Requests for A/E's approval and complete technical data for evaluation must be received at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.3 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008, Designation CS (cold-rolled, commercial steel), 0.0359-inch minimum nominal thickness.

C. Galvanized-Steel Sheet: ASTM A 653, with G60 hot-dip zinc coating.

D. Galvanized-Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0-mm thick.
1. Provide mirror furnished with a uniform plastic film 8 mils nominal thickness with acrylic adhesive which is moisture resistant and non-corrosive, meeting 16 CFR 1201-11 and ANSI 297.1 requirements category II tape back.

H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.4 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of manufacturers specified.
1. AJW Architectural Products
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Commercial Restroom Accessories Division, Bobrick Washroom Equipment, Inc.

B. Grab Bar:
1. Stainless Steel Type: Provide grab bars with wall thickness not less than 0.05 inch and as follows:
a. Mounting: Concealed, manufacturer's standard flanges and anchorages.
b. Clearance: 1-1/2-inch clearance between wall surface and inside face of bar.
c. Gripping Surfaces
1) Smooth, satin finish, unless noted otherwise.
2) Manufacturer's standard nonslip texture in wet areas (showers).
d. Heavy-Duty Size: Outside diameter of 1-1/4 inches minimum.
2. Grab bar shall be constructed of Type 304 stainless steel with satin finish. Concealed mounting flanges shall be 1/8-inch thick stainless-steel plate, 3-1/8 inch diameter, and each shall have 2 screw holes for attachment to wall. Flange covers shall be 0.03125-inch thick (fka 22-gauge), 3-1/4-inch diameter by 1/2-inch deep, and shall snap over mounting flange to conceal mounting screws. Ends of grab bars shall pass through concealed mounting flanges and be heliarc-welded to form one structural unit. Grab bars shall comply with ADA Accessibility Guidelines for structural strength. Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished.
a. Products:
1) Bobrick: B-5806 Series
2) Bradley: 832-001 Series
3) AJW Architectural Products: UG2 Series
4) American Specialties: 3700 Series
5) Gamco: 125S-Series

C. Sanitary-Napkin/Tampon Accessories:
1. Surface-Mounted Partition Mounted Sanitary-Napkin/Tampon Disposal (ND-1): Surface-mounted sanitary-napkin disposal shall be Type 304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Self-closing door shall be secured to cabinet with a spring-loaded, full-length, stainless-steel piano hinge and equipped with international graphic symbol identified sanitary-napkin disposal. Unit shall be furnished with a removable stainless-steel receptacle that is equipped with a tumbler lock. Receptacle shall have a capacity of 1.2 gallons.
a. Products:
1) Bobrick: B-254
2) Bradley: 4722-150000
3) AJW Architectural Products: U582/IGS
4) American Specialties: 0473-1A
5) Gamco: ND-5

2. Sanitary Napkin/Tampon Vendor (NV-1): Surface mounted napkin/tampon vendor shall combine two dispensing mechanisms in one cabinet to provide napkins or tampons at user's option. Dispensing mechanisms shall be convertible to allow change of coin denomination without purchasing new mechanisms or removing unit from wall. Unit shall be Type 304 stainless steel with all-welded construction. Cabinet shall be 0.03125-inch thick (fka 22-gauge). Door shall be 0.0500-inch thick (fka18-gauge); exposed surfaces shall have satin finish. Door shall have 7/8-inch, 90-degree return edges; be secured to cabinet with a concealed, full-length, stainless-steel piano hinge; and equipped with a stainless-steel cable door swing limiter and two tumbler locks keyed. Mechanism shall be operable with one hand and with less than 5 pounds of force to comply with barrier-free accessibility guidelines. Each coin box shall be equipped with a tumbler lock that is keyed differently than door locks. Unit shall carry no brand-name advertising.
   a. Products:
      1) Bobrick: B-2706C
      2) Bradley:
      3) AJW Architectural Products:
      4) American Specialties:
      5) Gamco:

D. Mirror Unit, Glass:
1. Stainless-Steel Framed Mirror (M-1, M-2): Mirror shall have a one-piece, Type 304 stainless-steel angle frame, 3/4 inch by 3/4 inch with continuous integral stiffener on all sides and beveled front to hold frame tightly against mirror; corners shall be heliarc-welded, ground, and polished smooth; all exposed surfaces shall have satin finish with vertical grain. Float/plate glass mirror shall be guaranteed for 15 years against silver spoilage. All edges shall be protected by plastic filler strips and back shall be protected by full-size, shock-absorbing, water-resistant, nonabrasive, 1/8-inch thick polyethylene padding. Corrugated cardboard is not an acceptable filler material. Galvanized-steel back shall have integral hanging brackets for mounting on concealed rectangular wall hanger(s). Mirror shall be secured to hanger(s) with concealed Phillips-head locking screws located in bottom of frame.
   a. Products:
      1) Bobrick: B-290
      2) Bradley: MIR780
      3) AJW Architectural Products: U700
      4) American Specialties: 0600
      5) Gamco: A-Series

2.5 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of following:
1. AJW Architectural Products.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Commercial Restroom Accessories Division, Bobrick Washroom Equipment, Inc.

B. Shower Curtain Rod:
1. Shower Rods (SR): Shower curtain rod shall be 1-1/4-inch outside diameter and constructed of 0.0500-inch thick (fka 18-gauge), Type 304, stainless steel with satin finish. Flanges shall be 0.0375-inch thick (fka 20-gauge), Type 304, stainless steel with satin finish. Flanges shall be 0.0375-inch thick (fka 20-gauge), one-piece, die-formed, Type 304 stainless steel with satin finish.
   a. Products:
      1) Bobrick: B-6047 by length as indicated
      2) Bradley: 9531
      3) AJW Architectural Products: UX2-B
      4) American Specialties: 1204
      5) Gamco: 125SR by length as indicated

C. Shower Curtain:
1. Shower curtains, shall be opaque, matte vinyl 0.006-inch thickness with hemmed edges and corrosion-resistant grommets. Color shall white. Curtains shall be fabricated as follows:
a. Curtains to be at least 10-percent wider than rod from which they hang and shall extend to within 2 to 3 inches of floor.
b. Shower Curtain Hooks: Stainless-steel, spring-wire curtain hooks with snap fasteners sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
c. Products:
1) Bobrick: 204-2/204-1.
2) Bradley: 9533/9536.
3) AJW Architectural Products: UX250P/UX169.
4) American Specialties: 1200V/1200-SHU (hook).
5) Gamco: 125SQ by length as indicated

D. Folding Shower Seat:
1. Folding Shower Seat (SS1): Folding shower seat shall have a frame constructed of Type 304, satin-finish stainless steel that consists of 0.0625-inch thick (fka 16-gauge) 1-1/4-inch square tubing and 0.0500-inch thick (fka 18-gauge), 1-inch diameter seamless tubing. Seat shall consist of 6 slats constructed of 5/16-inch thick, solidly fused plastic laminate with matte finish melamine surfaces, ivory-colored face sheets, and black phenolic resin core; secured to frame with stainless-steel carriage bolts and acorn nuts. Shower seat shall be equipped with two 3-inch diameter mounting flanges constructed of Type 304, 3/16-inch thick satin-finish stainless steel; a guide bracket constructed of Type 304, 0.0625-inch thick (fka 16-gauge), satin-finish stainless steel; and a spring constructed of Type 304, 0.0250-inch thick (fka 24-gauge) stainless steel that is spot-welded to base plate of Type 304, heavy-gauge stainless steel. Seat shall be able to lock in upright position when not in use. Shower seat shall comply with ADA Accessibility Guidelines for structural strength.
a. Products:
1) Bobrick: B-5181
2) Bradley: 9569
3) AJW Architectural Products: U929
4) American Specialties: 8206-R/8206-L
5) Gamco: 5181
2. Folding Shower Seat (SS2): Frame shall be fabricated of stainless steel tube, 1-1/4 inch x 18 gauge square for main frame with 1 inch x 18 gauge round cross members. The swing down legs are h-shaped yoke of stainless steel tubing, 1 inch x 18 gauge round tubing welded to 1-1/4 inch round x 12 gauge frame hinge. Wall flange is stainless steel with leg supports. Seat shall be 1/2 inch solid phenolic slats with white matte finish. Seat shall be automatically held in raised position by stainless steel cross member. Overall dimension 32 inch x 15 inch.
a. Products:
1) Bradley: 958
2) Bobrick
3) AJW Architectural Products
4) American Specialties
5) Gamco

E. Towel Hooks (TH):
1. Surface-mounted stainless-steel towel pin shall be constructed entirely of Type 304 stainless steel with bright polished finish. Flange shall be equipped with 0.0625-inch thick (fka 16-gauge) mounting bracket which locks to concealed 0.0625-inch thick (fka 16-gauge) wall plate with stainless-steel lock screw. Cap shall be 0.1406-inch thick (fka 10-gauge) stainless steel, welded to post.
a. Products:
1) Bobrick: B-7671
2) Bradley: 9115
3) AJW Architectural Products: UX110BF

4) American Specialties: 7340-B
5) Gamco: 7671

F. Recessed Soap Dish Tray at Group Showers (ST-2):
1. Recessed heavy-duty stainless-steel combination soap dish shall be constructed entirely of 18-8, Type 304, stainless steel with stain finish. Soap dish and flange shall be drawn and beveled, one-piece seamless construction. .
a. Rough Wall Opening: 6-1/4-inch wide by 4-1/4-inch high by 2-3/4-inch minimum recessed depth.
1) Products:
a) Bobrick: B-4380
b) Bradley
c) AJW Architectural Products
d) American Specialties
e) Gamco

2.6 WARM-AIR DRYERS

A. Hair Dryers (HRD)
1. H76-W; Excel.
2. Advantage Series AD90-MH; American Dryer
3. Airstyle Model B with “Q” Nozzle; World Dryer Corporation

B. Warm-Air Dryer
1. Mounting: Surface-mounted.
a. Unit located along circulation paths shall comply with ADA requirements for protruding objects.
2. Operation: Touch-button activated with timed power cut-off switch.
3. Cover Material and Finish: One of following.
a. Stainless steel with one of following finishes per ASTM A480/A480-M:
1) Finish No. 4 (“brushed” or “satin”).
4. Electrical Requirements: 120V, 15A, 1800W Maximum.
a. Coordinate with building electrical system. Provide disconnect when hand dryer horse power is ¼ horsepower of greater.

2.7 CHILDCARE/SPECIAL NEEDS ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of following:
1. AJW Architectural Products.
2. American Infant Care Products Inc.
3. American Specialties, Inc.
4. Foundations Worldwide Inc.
5. Koala Corporation; KB 200.
6. Safe-Strap Company, Inc.

B. Diaper-Changing Station (DCS):
1. Horizontal, Surface-Mounted Unit: Diaper-changing station with surface-mounted, mildew-resistant, molded-polyethylene body that folds horizontally against wall when not in use; projects not more than 4 inches from wall when closed; and is engineered to support a minimum of 250-pound static weight when opened. Provide unit with pneumatic shock-absorbing operating mechanism and built-in dispenser for sanitary liners.
a. Color shall be selected by A/E from manufacturer’s standards.

2.8 CUSTODIAL ACCESSORIES

A. Manufacturers:
1. AJW Architectural Products.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.

4. Bradley Corporation.
5. GAMCO Commercial Restroom Division, Bobrick Washroom Equipment, Inc.

B. Mop and Broom Holder:
1. Mop and Broom Holders (MH): Surface-mounted mop and broom holder shall be Type 304 stainless steel with satin finish. Unit shall be 36-inches long with 4 spring-loaded, rubber cam holders.
a. Products:
1) Bobrick: B-223-XX
2) Bradley: 995X
3) AJW Architectural Products: UJ13B
4) American Specialties: 8215
5) Gamco: MS

2.9 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:

C. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate requirements for blocking and construction of wall openings for recessed units.

B. Provide templates and rough-in measurements as required.

3.2 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
1. Verify blocking, if required, has been installed properly.
2. Verify location does not interfere with door swings or use of fixtures.
3. Comply with manufacturer’s recommendations for backing and proper support.
4. Use vandal-resistant fasteners and anchors suitable for substrate and project conditions.
5. Conceal evidence of drilling, cutting, and fitting to room finish.
6. Test for proper operation.

B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's instructions for type of substrate involved.

C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

D. Changing Stations: Install in accordance with manufactured instructions.
1. Changing stations and other accessories shall be installed to comply with requirements for accessible mounting heights, protrusions into accessible routes, and other requirements of ICC/ANSI A117.1.
2. Install units so they are level, plumb, and secure.

3. After installation, open and close units a minimum of 3 times. Verify units operate smoothly and properly latch. Adjust as required for proper safe use.
4. Wash exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean cloths. Do not use abrasives.

3.3 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

SECTION 11 31 00 – APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Various residential appliances and food service units.

B. See Appliance/Equipment Schedule or Equipment notes on the Drawings for acceptable models.

C. Related Sections include the following:
   1. Division 12 (Section ("Manufactured Wood (Educational Casework") for adjacent cabinets and plastic laminate tops that receive residential appliances.
   2. Division 26 Section "Low-Voltage Electrical Power Conductors and Cables" for services and connections to residential appliances.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.

1.4 CLOSEOUT SUBMITTALS

A. Closeout Submittals
   1. Warranties: Sample of special warranties
   2. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:
   1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.

B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 WARRANTY

A. Special Warranties: Manufacturer’s standard or Manufacturer’s and Third-Party extended warranty agreeing to repair or replace residential appliances or components that fail in materials or workmanship within the specified warranty period:
   1. Warranty Period: 2 years minimum.

PART 2 - PRODUCTS

2.1 APPLIANCES

A. Refer to the appliance/equipment schedule.

2.2 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Comply with plumbing and electrical requirements.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 11 31 00

SECTION 12 32 16 - MANUFACTURED PLASTIC-LAMINATE-FACED (EDUCATIONAL) CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Plastic laminate faced cabinets of stock design, including, but not limited to, and mobile casework, where indicated.
      a. This Work includes special and modified stock design preassembled units for installation as movable, fixed, or built-in, as indicated.
      b. The use of dimensions and specific requirements set forth in Drawings and Specifications are not intended to preclude the use of other acceptable manufacturer's products or procedures which may be equivalent, but are given for purpose of establishing standard of design and quality for materials, construction, and workmanship.
      c. Cabinets indicated to receive sinks shall be constructed to allow for installation of sinks of sizes indicated. Coordinate with Division 22 for sink sizes.
   2. Casework hardware and accessories.
   3. Solid-surfacing-material countertops.

B. Related Sections:
   1. Division 06 Section "Rough Carpentry" for wood blocking for anchoring manufactured wood casework.
   2. Division 07 Section “Joint Sealants.”
   3. Division 09 Section "Gypsum Board Assemblies" for reinforcements in metal-framed partitions for anchoring manufactured wood casework.
   4. Division 09 Section "Resilient Base and Accessories" for resilient base applied to manufactured wood casework.
   5. Division 22 Section “Plumbing Fixtures” for sinks.

1.3 DEFINITIONS

A. General: Definitions in Architectural Woodwork Institutes (AWI) “Architectural Woodwork Quality Standards” apply to the work of this Section, unless otherwise noted herein.

B. MDF: Medium-density fiberboard.

C. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed, including sides, and bottoms of cabinets more than 48 inches above floor, and tops less than 78 inches above floor. Surfaces that are visible in open cases, or through glass doors or grille doors, shall also be considered to be exposed portions.

D. Semiexposed Portions of Cabinets: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cases 78 inches or more above floor are defined as semiexposed.

E. Concealed Portions of Cabinets: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination
   1. Coordinate layout and installation of framing and reinforcements in gypsum board walls and partitions for support of manufactured casework.
      a. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.
   2. Coordinate casework installation with size, location and installation of service utilities. Sequence installation to accommodate required utility connections.

B. Preinstallation Meetings
   1. Preinstallation Meeting: Conduct meeting at Project site.
   2. Keying Meeting: Conduct meeting at Project site. Incorporate keying meeting decisions into final keying requirements.

1.5 ACTION SUBMITTALS

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

B. Shop Drawings:
   1. Include plans, elevations, sections, and attachment details.
   2. Show fabrication details, including types and locations of hardware.
   3. Show installation details, including field joints and filler panels.
   4. Show locations and sizes for blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   5. Show locations and sizes of cutouts and holes for items installed in cabinets.
      a. Indicate locations of plumbing and electrical service field connection by others.

C. Samples for Verification: 8-by-10-inch Samples for each type of finish, including top material.

1.6 CLOSEOUT SUBMITTALS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Warranty: Sample of special warranty.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative of educational casework manufacturer for installation and maintenance of units required for this project. The installer must have completed 3 projects of similar size and scope to this project in the last 5 years or a certified participant in AWI's Quality Certification Program. References of these projects shall be supplied upon request.

B. Materials shall contain less than 1 percent asbestos by content.

C. Composite wood products shall be labeled or show compliance with the Toxic Substances Control Act (TSCA) Title VI.

D. Quality Standard: Unless otherwise indicated, comply with requirements for modular cabinets in AWI's "Architectural Woodwork Quality Standards." Minimum quality standards shall be custom grade in accordance with AWI and additional requirements as specified herein.

E. Product Designations: Drawings indicate sizes, configurations, and finish material of manufactured wood casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish material, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured wood casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.

B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install manufactured wood casework until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify actual dimensions of construction contiguous with manufactured wood casework by field measurements before fabrication.
   1. Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating educational casework without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing then, and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manufactured wood casework that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Delamination of components or other failures of glue bond.
      b. Warping of components.
      c. Failure of operating hardware.
      d. Deterioration of finishes.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   1. Plastic-Laminate-Faced Manufactured Casework:
      a. Case Systems Inc.
      b. Stevens Industries, Inc.
      c. TMI Systems Design Corporation.
      d. Advanced Cabinet Systems.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The “Substitution Request Form” and complete technical data for evaluation must accompany requests for A/E’s approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum. Manufacturers shall submit the following items to be considered for approval:
   1. Architectural binder, cut sheets and specifications fully describing proposed products.

2. List of at least ten projects of similar size, material, design, and extent to that indicated for this Project; whose work has resulted in casework installations with a record of successful in-service performance, including names and phone numbers of Architect and Owner.
3. Sample of shop drawings produced for similar project.

2.2 SYSTEM DESCRIPTION

A. Quality Standard: Unless otherwise indicated, comply with the AWI's "Architectural Woodwork Standards" for grades of casework indicated for construction finishes, installation, and other requirements.
1. Grade: Custom.

B. Accessibility Requirements: Casework shall be provided to conform to the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this Section.

C. Performance Requirements
1. Casework shall meet or exceed load tests as outlined in ANSI A161.1, unless otherwise noted.
a. Countertops shall not deflect more than 1/4 inch when a load at 100 pounds per linear foot is applied, unless otherwise noted.
b. Shelving shall be capable of supporting 25 pounds/sq.ft., unless otherwise noted.
c. Cabinets supporting TV/monitor shall be capable of supporting a 250 pound capacity, unless otherwise noted.

2.3 MATERIALS, GENERAL

A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

B. Hardwood Plywood: HPVA HP-1, either veneer core or particleboard core unless otherwise indicated made with adhesive containing no urea formaldehyde.

C. Softwood Plywood: DOC PS 1.

D. Particleboard: ANSI A208.1, Grade M-2 made with binder containing no urea formaldehyde
1. Concealed Members in Music Casework: use one of the following.
a. Hardwood Plywood: Seven-ply Baltic Birch.
b. Solid Wood: Kiln-dried hardwood, select Poplar, Fir, or mill-option lumber.

E. MDF: ANSI A208.2, Grade 130 Grade 130, made with binder containing no urea formaldehyde.

F. Hardboard: AHA A135.4, Class 1 Tempered.

G. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

H. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
1. Laminate Adhesive: Natural hybrid PVA, type III water-resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients.
a. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

I. Thermally Fused Laminate (TPL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper complying with requirements of NEMA LD3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

J. Edgebanding for Plastic Laminate:
   1. Plastic laminate matching adjacent surfaces only where indicated. PVC edge-banding, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.
   2. Barbed T-edging will not be acceptable.

K. Edgebanding for Thermally Fused Laminate (TFL) Panels: PVC or polyester edge banding complying with LMA EDG-1 and matching color and pattern of thermoset decorative panels.

L. Cold-Rolled Steel Sheet: ASTM A 1008, suitable for exposed applications.

M. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304, with No. 4 satin finish.

N. Solid-Surfacing Material: Homogeneous solid sheets of filled acrylic resin complying with ISSFA-2-01 (2002).
   1. Type: Provide Standard type or Veneer type made from material complying with requirements for Standard type, as indicated unless Special Purpose type is indicated.

2.4 CABINET DESIGN

A. Design: Provide reveal overlay with wire pulls, unless otherwise noted.

B. Grain Direction for Wood Grain Plastic Laminate
   1. Vertical on both doors and drawer fronts, with continuous vertical matching.
   2. Lengthwise on face frame members.
   3. Vertical on end panels.
   4. Side to side on bottoms and tops of units.
   5. Vertical on knee-space panels.
   6. Horizontal on aprons.

C. Exposed Cabinet Materials:
   1. Plastic Laminate:
      a. Countertops: 0.048-inch thick minimum with textured finish and conforming to NEMA HGS standards, unless otherwise noted.
      b. Exposed horizontal surfaces except countertops: Nominal 0.028-inch thick minimum with low-lustre textured finish and conforming to NEMA HGS standards.
      c. Exposed interior and exterior vertical surfaces: 0.028-inch thick minimum with low-lustre textured finish and conforming to NEMA VGS standards.
   2. Unless otherwise indicated, provide specified edge treatment on all exposed edges.

D. Semiexposed Cabinet Materials:
   1. Plastic Laminate: Grade VGS.
      a. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
      b. Shelves: .028 inch thick minimum with low luster textured finish and conforming to NEMA HGS standards.
   2. Thermally Fused Laminate (TFL) Panels: Thermoset decorative panels may be used for semiexposed surfaces in lieu of plastic laminate, Grade CLS, as fabricator's option, unless otherwise indicated.
   3. Unless otherwise indicated, provide 1mm PVC on all semiexposed edges.

E. Concealed Cabinet Materials:
   1. Solid Wood: Any hardwood or softwood species, with no defects affecting strength or utility.
   2. Plywood: Hardwood plywood. Provide backs of same species as faces.
   3. Plastic Laminate: Grade BKL, 0.020-inch minimum thickness.

2.5 COLOR AND FINISH

A. Thermally Fused Laminate (TFL) Panel Colors, Patterns, and Finishes: As selected by A/E from casework manufacturer's full range.

B. Plastic-Laminate Colors, Patterns, and Finishes: Refer to “List of Finishes”.

C. PVC Edgebanding Color: As selected from casework manufacturer's full range.
   1. Colors of PVC leading edges:
      a. Open Units: Match exterior plastic laminate color.
      b. Horizontal and Vertical Front Cabinet Members: Match exposed plastic laminate color or as selected by A/E.
      c. Semi-Exposed Locations: Match interior plastic laminate color.
      d. Drawer and Door Fronts: As selected from colors to match plastic laminate, or as selected by A/E.

D. Solid-Surfacing Material Colors and Patterns: Refer to “List of Finishes”.

2.6 CABINET FABRICATION

A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

B. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
   1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semiexposed surfaces, unless otherwise noted or as required to meet “Performance Requirements”.
   2. Shelves:
      a. Exposed Locations: 1 inch thick, vertical grade plastic laminate both sides. Color to match cabinet exterior plastic laminate or as selected by A/E.
      b. Semi-exposed locations: 1 inch thick, thermally fused laminate (TFL) panels both sides.
      c. Front and back leading edges shall be edged with flat 1mm thick impact-resistant PVC edging to match shelf color.
      d. Number of adjustable shelves provided, unless indicated otherwise on the Drawings or on the Schedule
         1) Tall cabinets
            3 up to 60 inches — 5 up to 84 inches
            4 up to 72 inches — 6 up to 96 inches
         2) Base cabinets
            1 up to 36 inches
         3) Wall hung cabinets
            1 up to 24 inches — 3 up to 42 inches
            2 up to 36 inches
   3. Backs of Cabinets: 1/2-inch particleboard, plastic-laminate faced on exposed surfaces, thermally fused laminate (TFL) panels on semiexposed surfaces.
   4. Drawer Fronts: 3/4-inch particleboard, plastic-laminate faced to match doors.
   5. Drawer Sides, Backs, and Bottoms:
      a. Constructed of minimum 1/2-inch particleboard, plywood, hardwood lumber, or high-density fiber board; glued and doweled or dovetail jointed; surfaced with vertical grade laminate or melamine of balanced construction. Bottoms constructed of minimum 1/4-inch tempered hardboard, surfaced to match drawer sides, inset and glued to four sides. Reinforce bottoms on wide drawers with front to back inset stiffeners, 1 at 24 inch wide drawers, 2 at 36 inch and 4 at 48 inch; glue, fasten, and seal perimeter with hot melt adhesive.

1) Drawers:
   a) Sides, back and sub front shall be particleboard, 1/2-inch thick, laminated with vertical grade laminate or melamine of balanced construction. The back and sub front shall be doweled and glued into the sides. Dowels shall be fluted, with chamfered ends and a minimum diameter of 8mm.
   b) Drawer bottom shall be particleboard, 1/2-inch thick, laminated with vertical grade laminate or melamine of balanced construction, screwed directly to the bottom edges of the drawer box. Drawer bottom less than 1/2-inch thick will not be permitted.
   c) Paper storage drawers shall be constructed similar except retaining hood shall be included at the rear of each drawer.

6. File Drawers: Construct as specified above. File drawers shall have front-to-back and side-to-side hanger file capability with hanger channel for letter size files integral with file drawer sides. 3/16 inch by 1/2-inch removable steel channel to span side-to-side for legal size hanging files.
7. Doors: 3/4-inch particleboard or MDF, plastic-laminate faced may be provided as fabricator's option to wood drawers.

C. Shop cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

D. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.7 SPECIALTY ITEMS

A. Support Members: Furniture grade, epoxy powder coated steel or aluminum, of size and configuration as detailed, indicated or required by "performance standards". Exposed welds shall be ground smooth.
1. Steel Support Legs at Cabinet Assemblies: 2-inch by 2-inch by 0.1046-inch (fka 12 gauge) steel with welded top or side plate according to product design. Provide 3/8-inch diameter leveler with non-rusting foot pad of tear drop design for floor attachment, and leg shoe according to product design.
2. Countertop Support Brackets: Wall mounted, heavy duty, welded aluminum brackets for support of countertops and work surfaces.
   a. Extruded aluminum complying with ASTM B221, 6063-T5 alloy.
   b. Finish: Clear Anodized.
   c. Size: As required by countertop width to support.
   d. Product: As indicated on Drawings or EH Series as manufactured by Rangine Corporation (Rakks).
3. Countertop Support: Wall mounted, heavy duty, steel support brace.
   a. Steel, ASTM A36 or JIS G3131 SPHC Steel, 12 gauge.
   b. Provide holes in bracket for cable passage.
   c. Size: As required by countertop width to support.
   d. Finish: Manufacturer's standard powder coat paint finish.
   e. Product: As indicated on Drawings, Fastcap "Speedbrace".

2.8 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard powder-coated, commercial-quality, heavy-duty hardware.
1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.
2. Hardware shall conform to requirements of ADAAG.
3. Where specialty hardware items are noted on the Drawings or within the schedule provide that type of hardware in lieu of item specified herein.

B. Butt Hinges: Powder-coated, semiconcealed, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips with non-removable pins fastened with four screws in each leaf. No edge fastening. Provide 2 hinges for doors less than 48-inches high and 3 hinges for doors more than 48-inches high.
   1. Color: As selected by A/E from manufacturer's standard colors.

C. Pulls: Powder-coatedaluminum bent wire style pulls, fastened from back with two screws. For sliding doors, provide recessed powder-coated steel flush pulls. Provide 2 pulls for drawers more than 24-inches wide.
   1. Color: As selected by A/E from manufacturer's standard colors.

D. Door Catches: Zinc-plated or powder-coated, nylon-roller spring catch, or dual, self-aligning, permanent magnet catch.
   1. Catches shall comply with ADA requirements for pounds of pull required to open doors.
   2. Provide 2 catches on doors more than 48 inches high.
   3. Chain Stops
      a. Install on the following:
         1) Operable doors of tall wardrobe units and cabinets.
         2) Other operable doors that are restricted from swinging 180 degrees.
      b. Length of chain shall allow doors to open 90 degrees minimum.
         1) Exception: Shorten chain if required to prevent door or door handles from hitting obstructions.

E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
   1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
   2. Drawers: Provide one bumper on back side of drawer front at each corner.

F. Drawer Slides: BHMA A156.9, Type B05091.
   1. Regular drawers, knee space and pencil: Epoxy coated steel, bottom corner mounted with smooth quiet nylon rollers.
      a. Positive stop both directions with self-closing feature.
      b. Loading: 100-pound load capacity.
   2. Paper Storage: 150-pound load rated epoxy coated steel slides.
   3. File Drawers: Full extension, epoxy coated steel, bottom corner mounted with smooth and quite nylon rollers.
      a. Positive stop both directions with self-closing feature.
      b. Loading: 150-pound load capacity.

G. Drawer and Hinged Door Locks:
   1. Cylindrical (cam) or mortise type, 5-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.
   2. Cabinets to be keyed alike per room, each room keyed differently and master keyed, unless noted otherwise on drawings.
      a. Provide four keys per room and 6 master keys.
   3. Provide locks on all doors and drawers.

H. Adjustable Shelf Supports: Injection molded transparent polycarbonate friction fit into cabinet end panels and vertical dividers, adjustable on 1-inch centers. Each shelf support has 2 integral support pins, to interface pre-drilled holes, and to prevent accidental rotation of support. Support also provides non-tip feature for shelving. Structural load to 1200 lbs. (300 lbs./support) without failure.

I. Grommets for Cable Passage through Countertops: 3-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.

J. Paper Slots: 12-inches long by 1-3/4-inches wide by 1-inch deep; black, molded-plastic, paper-slot liner with 1/4-inch lip.

K. Plastic tote tray dividers shall be prefinished 1/4-inch thick tempered hardboard.

L. Cubicle cabinet dividers shall be 3/4-inch particleboard with laminate on both sides.

M. Tote Trays: Molded high impact plastic with cardholder on front.

N. Laminated/Decorative Glass: 1/4-inch laminated safety glass.
1. Consisting of two outer plies of glass with PVB or cured-resin interlayer.
   a. Kind LHS, consisting of two plies of heat-strengthened glass.
   b. Interlayer Thickness: Manufacturers standard thickness but not less than that required to comply as Type II safety glass material.
      1) Interlayer color and pattern: Semi-transparent manufacturer's standard "smoked" glass effect.

O. Coat Rods: 1-inch diameter pipe with nominally 0.083-inch thick wall (fka 14-gauge) chrome-plated steel installed in captive mounting hardware.

P. Mirrors: 1/4-inch thick polished mirror plate, ASTM C1503, Mirror Glazing, Quality-Q3.

Q. Wire Management (Option): Channel cable tray shall be a prefabricated metal or fiberglass structure consisting of a one-piece solid bottom channel section, complying with NEMA VE1, or FG1 and UL568.
1. Sizes and configurations shall be no less than that indicated.
2. Manufacturers:
   a. Chalfant Cable Tray
   b. GS Metals Corp.
   c. MP Huskey Corp.
   d. P-W Industries
   e. T.J. Cope
   f. Wiremold Co.
   g. Thomas & Betts Corp.
   h. Doug Mockett and Company Inc.

2.9 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.10 COUNTERTOPS

A. Countertops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Provide front and end overhang of 1 inch over base cabinets.
1. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
2. Shop cut openings to maximum extent possible to receive fixtures and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.
   a. For plastic-laminate clad countertops: Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Solid-Surfacing Tops:
   1. Solid-Surfacing-Material Thickness: 1/2 inch.
   2. Core Material: Particleboard made with exterior glue, 1 inch – 1-1/8 inch either fully supported or in framework configuration recommended by fabricator
   3. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
      a. Refer to “List of Finishes”.
   4. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
      a. Fabricate tops with shop-applied edges of materials and configuration indicated.
      b. Fabricate tops with shop-applied backsplashes or loose backsplashes for field application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of manufactured wood casework.

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

3.2 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.3 CASEWORK INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using shims as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
   1. Provide removable or false backs for access or concealment of heating or plumbing items.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
   1. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 24 inches o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than two fasteners.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch
   1. Fasten through back, near top and bottom, at ends, and not more than 16 inches o.c.
   2. Use toggle bolts at hollow masonry.
   3. Use expansion anchors at solid masonry.
   4. Use No. 10 wafer-head screws sized for 1-inch penetration at wood hanging strips.
   5. Use No. 10 wafer-head screws sized for 1-inch penetration into wood framing or blocking at wood-framed partitions.

6. Use No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or toggle bolts through metal backing or metal framing behind wall finish at metal-framed partitions.
7. Use toggle bolts at plaster on metal lath.

E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's "Architectural Woodwork Quality Standards".

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.4 INSTALLATION OF TOPS

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in shop.

C. Field Jointing: Where possible make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings. Scribe tops and backsplashes to walls and other adjoining vertical surfaces.
1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut plastic-laminate-clad countertops to fit adjoining work, refinish out surfaces, and repair damaged finish at cuts.

F. Secure tops to cabinets with Z- or L-type fasteners or equivalent, using two or more fasteners at each front, end, and back.

G. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
1. Install countertops with no more than 1/8 inch in 96 inch sag, bow, or other variation from a straight line.

H. Secure backsplashes and end splashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.

I. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.5 CLEANING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by A/E.

END OF SECTION 12 32 16

SECTION 12 63 13 - STADIUM AND ARENA SEATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes individual fixed, metal seating units.

B. Related Requirements:
   1. Section 12 61 16 "Molded-Plastic Audience Seating" for fixed chair-type seating.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of components, and finishes for seating.
   2. Sample Warranty: For special warranty.

B. Shop Drawings: For seating.
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Seating Layout: Show seating layout.

C. Samples for Initial Selection: For each type of exposed material, color, finish, and texture indicated.
   1. Include Samples of accessories involving color and finish selection.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For bench seating to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of bench seating that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including bench seating and attached components.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
   2. Warranty Periods: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of seating required, including accessories and mounting components, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Seating shall withstand the effects of gravity and other loads within limits and under conditions indicated.
   1. Vertical Live Load: 120 lb/ft..
   2. Horizontal Sway Loads: 24 lb/ft. parallel to seat and 10 lb/ft. perpendicular to seat.

2.3 SEATING

A. Description: Individual surface mounted backless stool.
   1. Basis of Design: “Conway Backless Stool” by Benchmark Contract Furniture.
      a. Model Number 18318
      b. 18 inch wide x 18 inch deep x 18 inch high.
   2. All aluminum construction, welded.
   3. Solid seat configuration in lieu of drain holes.
   4. Surface Mounted base, 13.5 inch diameter escutcheon base plate.
      a. Provide appropriate fasteners for mounting to concrete floor.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.

B. Fasteners: Aluminum or stainless steel. Use fasteners of the same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal joined.
   1. Use concealed fasteners for interconnecting metal components and for attaching them to other work unless exposed fasteners are unavoidable.
   2. Do not use power-actuated fasteners for concrete substrates.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
   1. Color: As selected by A/E from manufacturer’s RAL color chart of approximately 250 powder coat colors.

2.7 FABRICATION

A. Shop-Fabricated Connections: Welded according to AWS standards by AWS-certified welders.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install seating in locations indicated and fasten to substrates according to manufacturer's written installation instructions unless otherwise indicated.
   1. Anchor surface mounted base to concrete slab with appropriate fasteners and attach manufacturer’s escutcheon plate to cover anchors and base.

B. Install seating level, with uniform height above walking surface, and without sharp edges.

3.3 ADJUSTING

A. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.

B. Replace damaged and malfunctioning components that cannot be acceptably repaired.

END OF SECTION 12 63 13

SECTION 12 93 00 – SITE FURNISHINGS AND AMENITIES

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Benches
   2. Vehicle Guardrails (Type 1)
   3. Removal and replacement of existing Type 1 Vehicle Guardrails
   4. Vehicle Guardrails Type 2 at Service Drive (Per INDOT Standards, modified)

B. Related sections include the following:
   1. Division 03 Section "Cast-in-Place Concrete" for installation of pipe sleeves cast or anchor bolts cast in concrete footings.
   2. Division 31 Section "Earth Moving" for excavation for installation of concrete footings.

1.3 SUBMITTALS

A. Samples for Initial Selection: For units with factory-applied color finishes.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Size: Not less than 6-inch-long linear components and 4-inch-square sheet components.

C. Quality Assurance/Control Submittals
   1. Product Data: For each type of product indicated.

D. Closeout Submittals
   1. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
   1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211.
   2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221.
   3. Structural Pipe and Tube: ASTM B 429.
   4. Sheet and Plate: ASTM B 209.
   5. Castings: ASTM B 26.

B. Steel and Iron: Free of surface blemishes and complying with the following:
   1. Plates, Shapes, and Bars: ASTM A 36.
   2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.
   3. Tubing: Cold-formed steel tubing complying with ASTM A 500.
   4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011 and complying with dimensional tolerances in ASTM A 500; zinc coated internally and externally.
   5. Sheet: Commercial steel sheet complying with ASTM A 1011.
   6. Perforated Metal: From steel sheet not less than 0.0897-inch nominal thickness; manufacturer's standard perforation pattern.

7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
8. Malleable-Iron Castings: ASTM A 47, grade as recommended by fabricator for type of use intended.
9. Gray-Iron Castings: ASTM A 48, Class 200.
10. Welded metal grid

C. Stainless Steel: Free of surface blemishes and complying with the following:
1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
2. Pipe: Schedule 40 steel pipe complying with ASTM A 312.
3. Tubing: ASTM A 554.

D. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or non-corrodible materials; commercial quality, tamperproof, vandal and theft resistant, or concealed, recessed, and capped or plugged. Provide one of the following:
1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on-grade substrate; one per leg, unless otherwise noted.
2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; minimum two per unit or as required by manufacturer.

E. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

F. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
2. Hot-Dip Galvanizing: According to ASTM A 123, ASTM A 153, or ASTM A 924.

2.2 BENCHES

A. Benches: 6' Length CityView Steel Bar End Bench
1. Manufacturer: Site Scapes PO Box 22326 Lincoln, NE 68542 888-331-9464
2. Products:
a. Seat Straps: Straps are made of 5/16" x 1 ½" carbon steel flat bar
b. Support Tubes: Seat straps are supported by 1" dia. Schedule 40 carbon steel tube
c. Foot Plates: Foot plates are 5/16" x 1 ½" stainless steel. Each plate has a 9/16" hole for mounting
3. Install product surface mount in accordance with manufacturer installation instructions and drawings. Benches are secured with four 1/2" dia. x 4"-5" long stainless steel anchor bolts.
4. Color to be selected by owner.

2.3 GUARDRAILS

A. Vehicle Guardrail Type 1
1. Galvanized Steel Rails and posts (Match existing Guardrail)

B. Vehicle Guardrail Type 2
1. Guardrail "W" Beam and posts shall be hot-dipped galvanized steel conforming to AASHTO and INDOT Section 601 and 910 Standards.
2. Surface Mounted per Details.

2.4 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

E. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. All exposed metal surfaces on tables, seating, and trash receptacles shall be coated with a Panguard II powder-coat finish.

2.6 STEEL AND GALVANIZED STEEL FINISHES

A. Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Install all site furnishings with embedment type mounting prior to paving and landscaping. All other surface style mounted site furnishings to be installed after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Post Setting: Set cast-in or embedment type support posts in concrete footing with smooth top, shaped to shed water to depths as required by manufacturer. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Store and Install Apex Inverted Bike Parking Racks per manufacture's written instructions.

3.3 CLEANING

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 116833

SECTION 13 15 00 - CARMEL HIGH SCHOOL 1622
COMPETITION SWIMMING POOL, THERAPY POOL, DIVING POOL, WARM WATER POOL AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. Drawings and General Provisions of the contract including supplementary Conditions and Division 01 Specifications Sections shall apply to this section.
B. Section 31 2323 - Backfill
C. Section 03 3000 - Cast-In-Place Concrete: Concrete systems.
D. Section 04 2000 - Unit Masonry Assemblies: Cavity wall construction.
E. Division 05 Metals - Structural steel, metal deck, and cold-formed metal framing, as applicable.
F. Division 07 Thermal and Moisture Protection
G. Section 09 3000 - Tiling: Wall tile and misc. tile in pool areas
H. Division 13 1500 Swimming Pools
I. Division 13 1560 Scoreboard and Record Boards
J. Division 22 Plumbing: Fixtures and piping, as applicable.
K. Division 23 Heating, Ventilating and Air Conditioning: Mechanical systems, as applicable.
L. Division 26 Electrical: Electrical systems and components, as applicable.

1.02 DESCRIPTION OF WORK

A. This section of the specifications is intended to furnish and install complete Competition Swimming Pool Construction, Therapy Pool Construction, Diving Pool Construction, Upgrades to existing 50 Meter Pool, Decks and equipment, installation and service as specified herein.

1.03 INSTRUCTIONS TO BIDDERS:

A. The bidding pool contractor is expected to bid on specific products and methods as stated herein and in accordance with General Contractors/Construction Managers instructions to bidders scope which shall take precedence over any coordination items listed herein or on the drawings. Deviations from the documents without written approval from the architect of consultant shall raise grounds for termination and the contractor shall be held responsible to correct any and all violations and or deficiencies as found by the owner or his representatives at the expense of the Pool Contractor.

B. TEC Specialty Construction Brand Tile product or accepted equal as evidenced in their 25 year System with waterproofing and specifically in accordance with their technical specifications and installation manual is the preferred manufacturer of all tile setting and or grout materials.

C. The Owner/Architect reserves the right to reject any Pool Contractor's request to bid if the evidence submitted by, or investigation of, such Contractor fails to satisfy the Owner/Architect or Designated representative in that such Contractor is properly qualified to carry out the obligation of the contract and to complete the work described or if the Contractor does not meet the sum or in part the qualifications or documents as stated herein.

D. The method of water recirculation, concrete gutter, specified and shown on detailed drawings is intended as the basis for receiving bids and is the preference of the Owner. Voluntary Alternate gutters to be bid in accordance with the specifications as stated in a previous section. The system as specified is the basis for receiving bids, however any bidder, May at his option, offer a substitution for consideration. In proposing a substitution, the project bidder is cautioned to refer to Section A.01-2 of the specifications and as stated herein. Any

proposed substitution shall include a mechanical drawing incorporating all required changes in layout, piping and valves. The cost of such changes shall be included in the price of the substitute. A concrete perimeter overflow system with filtered water supply line under the pool floor according to the details and shown on accompanying drawings.

1.04 SUBSTITUTIONS:

A. A detailed investigation has been made before selecting the specified swimming pool, recirculation, filtration and other special pool equipment. If any contractor wishes to submit a substitute swimming pool, recirculation system, filter and/or pool deck equipment he shall submit a formal request in writing 15 business days prior to bidding with any information related to or layouts required which may be different than what is shown on the bid documents.

B. After bidding if a voluntary alternate is offered said contractor shall submit his plans and specifications to the architect and other related areas affected by the change. This results as an owner's option. Said plans and specifications shall be for this specific project and show the installation of the proposed substitute equipment. All changes required in the pool structure or in the building construction or any other areas related to the change shall be the sole responsibility of said contractor offering the substitute. In the event the option is chosen said contractor will be responsible for any additional costs due to the omission of affected work. This is to assure true costs of the alternate have been properly represented. Any product offered as an owner's option must be proven design with at least ten (10) installations of this size in service for more than two (2) years.

C. Manufacturers or Pool Equipment Contractors not mentioned herein wishing to bid on this project must submit a written request to the Architect no less than 15 business days prior to bid date. Any proposed substitute filter shall have the approval from the National Sanitation Foundation as evidenced by the filter number appearing in the current NSF Testing Laboratory listing for swimming pool filters at the flow rate and micron particle removal equal to the base bid required for the project.

1.05 SUMMARY OF WORK INCLUDED IN THIS SECTION

A. This section by Pool Contractor includes the construction and complete installation intent as stated herein of the pools and but not limited to:

1. All pool related documents, permits, plans and fees including but not limited to bidding “pool” contractor for submission of all Architects/Engineers plans and project specifications as well as any subsequent changes to the State and County for Construction Permits, Plumbing and or Electrical permits.

1.06 QUALITY OF MATERIALS

A. Special attention is directed to the materials, products and equipment described in these specifications. They establish a standard of required function, dimension, appearance and quality. Where only one manufacturer's name is mentioned for a particular item of equipment or material, the Pool Contractor's base bid shall be on that item. Whenever the words "or equal", "or approved equal", or "equal as approved" appear in the specifications, they shall be interpreted to mean material or an item of equipment equal in quality to that named. The burden of proof of equality or service shall be on the supplying contractor.

B. Proof of inequality is not implied by the specifications and is not a burden of the Owner or his representative. If the Pool Contractor submits a substitution of an "equal" basis, he shall assume all risks involved should the Architect find it not acceptable. The Pool Contractor shall

assume all costs for changes in drawings and specifications affected by the substitution, and the cost of the increase, if any including adjoining work.

C. Where references are made to Federal Specifications, American Society for Testing and Material, American Standards Association, American Institute of Steel Construction, Steel Institute, and similar associations, organizations and standards, it shall be construed to mean their current specifications and designations as amended as of the date of the opening.

1. Concrete
   a. Tests shall measure slump, air and compressive strength as measured by a testing lab.
   b. Compressive strength shall provide for 50 cubic yards or some fraction thereof for each day the concrete is poured.
   c. Comply with section ACI-318, Sub 4.3 with samples ASTM C172, cylinders ASTM C31 and tested ASTM 39. Moist cure for 5 days @ 70 degrees.
   d. Slump and air shall be on site and comply with concrete section as contained in this section and concrete section. Slump Tests shall be made in accordance with ASTM C143. Air shall be in accordance with ASTM C231 for normal weight concrete. If slump or air is outside the parameters the concrete shall be rejected.
   e. Concrete temperature ASTM C 1064, When air temperature is above 90 degrees F maximum delivery time shall be 60 minutes. Less than 90 degrees maximum delivery time shall be 75 to 90 minutes. For cold weather placement follow ACI 306. Concrete at no time shall reach a temperature of 50 degrees F or less and not more than 80 degrees at point of placement.
   f. All tests shall be as specified or greater than the average of 3 consecutive tests but no more than 500 psi below the average. All cylinders shall be moist cured to assure a proper test. Additional tests may be procured in accordance with ACI-318 Sub 4.3.
   g. For placing concrete follow ACI 304, “Guide for Measuring, Mixing, Transporting and placing Concrete” and as specified.
   h. Fly ash shall not exceed 25 percent of cement content by weight.

2. Plumbing/Mechanical
   a. All pools piping shall be installed and maintained as stated in another section. Initial testing shall be subject to 50psi maintained for 4 hours. Testing shall be hydrostatic with all air being removed from the pipes.
   b. Maintain pressure as stated during construction.

1.07 PATENTED MATERIALS:

A. This contractor shall pay all royalties and license fees. He shall defend all suits of claims for infringement of any patent rights and shall save the Owner or his invitees harmless from the loss on account thereof, except that this contractor shall not be responsible for all such loss when a particular manufacturer or manufacturers are specified, but if this contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the contractor, Owner or Architect.

1.08 CODES

A. All work in this division shall be according to current applicable Local, State and National Codes and Regulations.

1. State Health Department for Public Pools

2. National Swimming Pool Institute for Public Pools
3. Consumer Products Safety Commission
4. State Plumbing and Electrical Codes
5. National Electrical Code
6. National Sanitation Foundation
7. American Society for Testing and Materials
8. American Concrete Institute
10. American Society of Mechanical Engineers
11. American National Standards Institute
12. Consumer Product Safety Commission
13. NEMA ICS 7, 7.1, 250, 4X Enclosures
14. NFPA 70 National Electrical Code, National Fire Protection Association
15. NETA STD ATS Testing
16. ADAAG, American Disabilities Act Guidelines
17. Department of Homeland Security
18. National Federation for High School Athletics Association

1.09 QUALIFICATIONS OF POOL CONTRACTOR:

A. The bidding pool contractor must have successfully constructed at least Five (5) pools of this type without compromises to or by the owners and or others which could or have had construction consequences related to lack of due care or consequential damages. Each of these pools having a water surface area equal to or larger than the pool described herein. Upon investigation these pools and any other facilities would be found to be completed in a satisfactory manner with the type of equipment, as specified, herein having been in operation for at least three (3) years. The pool contractor shall furnish complete evidence that he has the facilities to complete all phases of this trade division.

B. The Owner/Architect reserves the right to reject any Pool Contractor's request to bid if the evidence submitted by, or investigation of, such Contractor fails to satisfy the Owner/Architect that such Contractor is properly qualified to carry out the obligation of the contract and to complete the work described or if the Contractor does not meet the qualifications stated herein.

C. It is the desire of the Owner and by the intent of these documents that this bidding contractor furnish and install a complete pool package so that all warranties and/or guarantees become the sole responsibility of one single contractor and further to be able to furnish a necessary service staff who are capable of properly servicing emergency situations.

1.10 QUALIFICATION SUBMITTAL:

A. The bidder shall, within (7) seven days of notification of selection, for this award, submit to the Architect. A designation of the work to be performed by the bidder with his own forces.

1. A designation of the work to be performed by the bidder with his own forces;
2. The proprietary names of the suppliers and/or subcontractors of principle items or systems of materials and equipment proposed for the work; Including phone numbers, contact person, date of equipment order and expected delivery dates.
3. A list of names of the subcontractors and other entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principle portions of the work. In the event of long lead items or those items that could jeopardize the project schedule the pool contractor shall so state at this time. If no statements are contained in this notice the owner assumes all equipment will be available as needed.
4. Assuming there are no objections to the information as stated herein and within 7 more days make application with fees to the State and submit necessary drawings as required.

5. The bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the suppliers, persons, or entities proposed to furnish and perform work described in the bidding documents. Prior to the award of the contract, the Architect will notify the bidder in writing if either the Owner or the Architect, after due investigation, has reasonable objection to any such proposed supplier, persons, or entity.
6. If the Owner or Architect has reasonable objection to any such proposed suppliers, person or entity, the bidder may, at his option:

    a. Withdraw his bid
    b. Submit an acceptable substitute supplier, person or entity, with an adjustment in his bid price to cover the difference in cost occasioned by such substitution. The Owner may, at his discretion, accept the adjusted bid price or he may disqualify the bidder.
    c. In the event of either withdrawal or disqualification under the subparagraph, bid security may not be forfeited, no compensation will be given for any efforts made; not withstanding the general provisions or qualifications on his bid security.
    d. Suppliers, persons and entities proposed by the bidder and to whom the Owner and the Architect have made no reasonable objection must be used on the work for which they were proposed and shall not be changed except with the written consent of the Owner and the Architect.

7. The owner may at his option interview contractor(s) with the aide of a video camera or recording device.

1.11 SUBMITTAL:

A. All submittals will be made in accordance with the requirements of Division 1 - General Requirements and in strict compliance of the following:

B. Within 30 days of Notification of award the Pool Contractor shall submit Shop Drawings electronically and at completion on a thumb drive and any information pertaining to this project. This information shall contain all relative information covering equipment and fabrication(s) as required. A transmittal letter shall be submitted with the shop drawings with a copy of the State Permit Application as well as fees paid.

1. The front of the shop drawing submittal shall contain a numbered list of all equipment with the same numbers and the same order as indicated herein with each tab item and section number contained within the submittal, this must be in the same order as the specifications section for each item and shall have a blank, blank piece of paper in front of the item need to review, as well as plans listing at the top of the item along with plan sheet numbers and information contained on the plan. In front of each cut sheet or submitted item shall be a blank, blank white page with a heading and description for each item and indicating what is on the next page. This will be used for any particular notes at the time of review. If assembled in any other manner the entire submittal shall be rejected. If rejected the submitting contractor must hand deliver and resubmit all information as required within 48 hours.
2. The submittal is stamped indicating it has been checked for compliance. Other conditions or factors related to the installation which may affect performance or operation is the responsibility of the pool contractor/manufacturer. Compliance with other trade Divisions is the responsibility of the pool contractor.

    a. Stamp will state Rejected indicating the item does not comply with the specifications and/or Bid Documents

b. Accepted as Noted or Approved as Noted: Indicating it is accepted under the conditions or as indicated in the specifications or on the plans
c. Accepted or Approved indicating the item complies with the specifications
d. No Exceptions (Pool Contractor is expected to submit what is specified).

3. At the time of owner instruction, final approved submittals will be given by the pool contractor, to the owner with the as-builts.
4. Timely submittal is the responsibility of the pool contractor. No portion of his work shall commence without shop drawing approval including sleeve elevations and locations. The checking is intended to verify the sleeves with the bidding contractor making sure these sleeves correspond with the piping. Pool Contractor is cautioned that if during this period he is expecting to start his portion of the work and he assumes all responsibility for such in the event proper approvals have not been obtained. The completeness of the shop drawings are the responsibility of the pool contractor. Review will only be for the information submitted and not as a check list for items not submitted or not properly marked on the submittal. Contractor has bid the project with the equipment as specified he is expected to furnish and install what is specified.
5. Contractor shall accept full responsibility for all information as contained herein and on the drawings. Some items are not show on the drawings but are listed in the specifications they are expected to be submitted and show up on the site and be installed in accordance with this information. Submittals lacking proper descriptions may not be marked up or may be marked as approved or accepted on the item specified. Any additional coatings or performance related information not noted is expected to be installed even though it was not noted in the shop drawing review. Omission does no exonerate the contractor from installing the item as it is described herein. The review is for general conformance with layouts elevations and quantities being the responsibility of the contractor. Not submitting this information as described or within the time frame as required does not allow the contractor additional time. This contractor is totally responsible for any errors or omissions in locations especially as they relate to location or elevation that directly affects it connection to another component.
6. Engineering data covering all systems, equipment, structures and fabricated materials, which will become a permanent part of the Work under this Contract shall be submitted for review. This data shall include drawings and descriptive information in sufficient detail and scale to show the kind, size, arrangement and operation of component materials and devices, external connections, anchorage's, supports required, performance characteristics, fabrication and dimensions needed for installation and correlation with other materials and equipment. A certification with the shop drawing shall state in writing indicating that all equipment will connect into, fit into and be connected into the space allotted and as shown in the drawings.
7. All submittals shall be stamped and checked off indicating the item does comply with the documents with the approval of the contractor as well as project name. Each submittal shall indicate the intended use of the item, as well as any specific item related to that item. Each item must be approved. Multiple items requiring approval/acceptance shall have a blank page in front of each of the items. Information on that page shall be as stated above. Specific information related to that item shall be submitted.
8. Contractors stamp of acceptance and or approval is a representation that the accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data and that he has review or coordinated each submittal with the requirements of the Work and the Contract Documents. Each submittal shall include a statement prepared by the originator of the Drawings with a certificate certifying compliance with the Contract Documents along with any deviations specifically identified.
9. Note certification of or equal or approved equal status. Any and all deviations from the Contract Documents shall be so listed as a deviation or alternate with a description as it

relates to the deviation. Note substitution section herein. Any deviation not accepted requiring additional work by another trade division shall be paid by the Pool Contractor.

10. Contractor shall accept full responsibility for the completeness of each submission and in the case of a resubmission, shall verify that all exceptions previously noted have been taken into account. In the event that more than one resubmission is required because of failure of Contractor to respond to exceptions and rejections previously noted.
11. Review of drawings and data submitted by Contractor will cover only general conformity to the Drawings and Specifications, external connections and dimensions that affect the layout. Review does not indicate a thorough review of all dimensions, quantities and details of the material, equipment, device or item shown. Review of submittals shall not relieve Contractor from responsibility for errors, omissions or deviations or responsibility for compliance with the Contract Documents. When the information is returned Rejected, Revise and Resubmit or no exceptions submit specified item, the corrections shall be made as noted thereon and as instructed and six corrected copies (or one copy and one corrected reproducible copy) needs to be resubmitted. Approved as Noted or Accepted as Noted indicates the conditions of acceptance, the item does not need to be resubmitted. The contractor is responsible for installing the item as corrected or so noted.
12. When correct copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately and revisions made other than those call for on previous submissions.

C. Submit shop drawings with any specific notes for all components as contained in each section of this Division in the order and format as indicated in another section indicating all equipment as stated herein and related to but not limited to the following equipment or details such as must be submitted with the shop drawings to scale as required. If some of the information related to that item is not on the cut sheet then write that information on the submittal sheet. If the information is needed for other trades then a separate submittal shall be made and submitted including but not limited to:

1. Design mix
2. Pool details
3. Sleeves with locations and elevations
4. Pipe sleeves
5. Reinforcing/Concrete details
6. Typicals with penetration details
7. Special fabrications
8. Sections
9. Locations
10. Settings
11. Plumbing details
12. interconnecting parts
13. Manufacturers names and Model numbers
14. Filtration equipment components
15. Chemical feed equipment with components and connections to related equipment
16. Electrical components
17. Electrical layouts
18. Electrical controls
19. Filter room layout
20. Fill equipment
21. Exchanger
22. Drains and any other components stated herein or required to complete the installation of the facility.
23. Layout details for all equipment involving other trades.

D. Upon receipt of the marked up submittal the contractor shall submit an Electronic Listing with a description and 8.5” X 11” of all details detail for all items requiring a Model No. or color selection for all areas of the pool and deck. These items shall include model numbers as well as a detail indicating how that item(s) will be used as well as how it will be installed. Final color selections will be selected and confirmed by the Architect. A separate color list shall be

submitted along with a mock up of all tile and or finishes to be used with the actual colors for each area of field and trim colors. 1% Additional tile for stock.

E. Shop drawings missing from this submittal shall be so stated on a piece of white paper as pending with a description of what is missing. Missing, rejected or shop drawings not submitted in the order as stated herein shall be rejected and the contractor shall hand deliver to all parties required. Pending shop drawings requiring additional time shall be hand delivered to the Architect no later than 30 days from the original notice. Any shop drawings returned to the pool contractor as accepted with specific corrections marked as resubmit or rejected shall be resubmitted within 10 days.

1.12 CONTRACTORS RESPONSIBILITY:

A. The owner hereby assumes that the systems as installed are compatible with the water as used and maintained.

1. Pool Contractor shall obtain drawings from the Architect required to submit to any and all agencies, specifically Swimming Pool Application to:

a. Department of Homeland Security,
Division of Fire and Building Safety,
Plan Review Branch,
Indiana Government Center South,
402 W Washington St. RM E245,
Indianapolis, Indiana 46204-2739

Indiana State Department of Health Article 20 Swimming Pool Code, 675 Indiana Administrative Code, Swimming Pool Rule 410 IAC 6-2.1Director of the Health Department and pay all necessary fees and obtain any inspections associated with obtaining permits to construct and or erect a completed Pool as stated herein and shown in the documents. On the Pool Contractors letterhead the Pool Contractor shall furnish to the Architect a list of additional Architectural and Mechanical Drawings needed to be submitted or resubmitted for permits. Those drawings shall be submitted to the Director of the Health Department and any other agencies requiring permits. All drawings, applications and fees shall be submitted by the Pool Contractor. Any additional information or changes required shall also be revised and resubmitted by the Pool Contractor for and to obtain a State Construction Permit.

2. Pool as-built Drawings shall be properly detailed and dimensioned with photographs for every item including showing the locations and installation of all hidden items, piping, steel or the like with the photographs verifying the accuracy of the as-builts. All items shall be submitted to the owner at project completion.

3. Pool contractor is responsible for bidding any and all items as specifically stated within all of the documents for this project, specifically items as contained herein. If he is making interpretations as to or about the "or equal", "or approved equal" or "Accepted Equal" without verification, in writing from the Architect for any item that is not specifically listed herein or accepted separately, he assumes all risk or liability in the event item(s) are rejected and shall not receive any additional compensation for such items.

B. If there is a subsurface water condition on the site; the pool shall be kept full of water at all times and a plexiglass sign shall be placed in each of the equipment rooms.

1. The pool contractor shall hang with stainless steel screws and anchors an 18" X 24" permanent plastic sign with 2" letters, DANGER- HIGH WATER CONDITION UNDER

THE POOL DO NOT DRAIN POOL WITHOUT PROPER SUPERVISION IT COULD COME OUT OF THE GROUND. Procedures shall also be in place for draining and maintaining the pools as indicated in other sections.

2. In any case a separate permanent laminated in plexiglass sign with isometric as any or all wording for any or all instruction in Microsoft word or autocad in a minimum number 12 font shall be hung in the pool equipment room detailing procedures for safely draining the pool.
3. The pool contractor is responsible for posting a 18" X 24" procedure laminated in ¼" plexiglass and mounted on the filter room wall any and all procedures and or cautions related for or to the owners draining of the pool.

C. A 18" X 24" laminated sign set in plexiglass and shall be hung with stainless steel anchors in the pool equipment room detailing a step by step instruction for operating the systems.

1. An isometric shall show the locations of all valves and pool related equipment in the pool equipment rooms with detailed step by step instructions for backwash and all functions of the pool. The numbers shall correspond to white tags with black numbers the valve tags on each item.
2. Each pump shall have a laminated 8.5 X 11 mounted in plexiglass above each of the pumps. The sign shall have the pump curve and conversions of 1# differential for 5" or 5# for vacuum and head converted from the pump curve to flow typed in the sign.
3. A separate warning sign shall also be hung in the room is 1" high vinyl red letters stating, DANGER MIXING OF CHEMICALS COULD CAUSE DEATH OR PERMANENT EYE AND/OR LUNG DAMAGE OR BURNS and any specific instructions related to the operation or draining of the pool.
4. Along with the valve tags equipment, filters, pumps, boxes, chemical equipment shall be properly identified as described in another section.

D. Pool contractor is responsible for the pool shells, tanks, building and components and everything as stated herein for the duration of construction. He shall make no assumptions as to outside conditions or events, which may occur during construction, such as power failures, spilled paint or the like, which could cause damage to the pool tank such as not being cleaned and prevent tile adhesion or if the pool tanks were to float during construction.

1. Pool Contractor shall take all necessary precautions to make sure such things or event do not occur. Should the conditions dictate and such an event should occur this contractor shall provide whatever monetary and labor means deemed necessary, as directed by the Architect or Engineer to fix repair or replace and complete all work as described herein and with the same standards.
   a. When initial draining is required (first time the pool is drained for cleaning) this contractor shall supervise at no charge to the owner such draining and instruct Owner as to proper procedures for future draining.
   b. The pool contractor shall post a permanent plastic sign in the pool equipment room detailing procedures for operating and draining the pool even if a high water condition does not exists.
2. If some portion of the work as specified in this section or another section that is related to this section and a clarification has not been raised to the Architect ten (10) days prior to bid time or at the time of interview it is assume to be included in this contractors scope of work.

E. Contractor is expected to Punch out the Swimming Pool as the project progresses. Final Punch list shall be sent by the Pool Contractor to the Architect 30 days prior to job completion for verification. Items not completed in 30 days shall be completed by other trade Divisions or a separate Pool Contractor. Punch List shall be presented by the Pool Contractor in writing to

the Architect no later than 45 days prior to completion of the entire project. The owner using the pool does not constitute substantial completion. Warranties do not commence until all items on the Punch List have been completed. If the pools need to be drained due to faulty workmanship or warranty items, the costs of 1 cent/gallon shall be paid by the pool contractor; faulty or incomplete items shall be paid by the Pool Contractor.

F. Contractor is responsible for maintaining 10# min. of pressure on all circulating piping until pool deck has been placed. Protection of piping from freezing shall also be taken into consideration. It is the sole responsibility of the Pool piping contractor and or Pool Contractor to maintain the integrity of all recirculating piping. Dry fit equipment in filter room and verify with the owner or pool operator the placement of all equipment especially chemical storage and controller location. All drop outs shall be sealed so loose debris does not get into the dropout. If dropouts are not properly sealed the Pool Contractor shall provide video camera footage to prove debris has not entered the piping systems.

G. Contractor is also responsible for protecting all new equipment from damage, dirt, paint, or any abuse until the project has been finally turned over to the owner. If damage, paint or excess dirt and debris accumulates on any equipment and it can no longer look the same as it did when it left the manufacturer the contractor is expected to replace such equipment at his expense.

H. Tile Deck. Contractor shall furnish a layout and statement of pitch prior to installing any deck tile. Any areas requiring pitch to drain shall be ground or raised to assure no puddling occurs. Statement shall indicate deck was flooded and all water pitches to deck drains with a maximum slope of 2% or ¼" per foot maximum to the deck drains and no puddling occurs.

1.13 START UP AND ENGINEERING SERVICES:

A. A qualified representative of this contractor or the manufacturer shall visit the site after the installation of the filter has been completed and shall put the filter into operation and shall assist and instruct the Owner's representative for 10 days in the operation of the filter and related pool equipment. This is over and above inspection and placing the system in operation.

B. The pool contractor shall supply the services of a competent and experienced field engineer for a period of at least three (3) days during and after installation to inspect the completed installation, and before the owner is instructed to adjust the automatic controls to the proper set points, place the system in operation and give operating instructions relative to its care and use. This is over and above owner training.

C. The pool contractor shall place the operating instructions Laminated in a chemical resistant 18" X 24" with diagrams outlining the valve legend with each valve tagged to correspond to the valve chart in a permanently laminated clear Plexiglas frame mounted in the pool equipment room. Operating instructions shall be step by steps starting with Number one through normal operation, backwash and draining of the pool. Valve numbers on chart shall correspond to valve tags. Valve tags shall be Recreonics Model No. 80-506.H.R and 80333.

D. All pool piping within the pool equipment shall be clearly marked with directional arrows indicating normal direction of flow. The pool shall be balanced to the Langlier Index and all chemical containers shall be filled at the time of instruction. State required signage as well as additional signage as contained herein shall be furnished and or installed as described herein.

E. Pool Contractor shall place the pool systems into operation, balance the pools and furnish a 30-day supply of all chemicals. During the instruction the Pool Contractor shall check all items

related to the installation of the pool and verify that installation of these items will not affect the warranty of any pool-related item. If this condition exists the Pool Contractor shall send the Architect a registered letter describing these items.

1. The owner's representative shall also receive 3 days of instruction with video taping being optional for the owner.
2. Over the next 6 months the pool contractor shall make (2) (3 hours minimum) additional visits to the site to reinstruct or answer any questions.
3. At the time of startup the Pool Contractor shall set up the dates for (2) additional visits at 1-month intervals to assist the owner. Each additional visit shall be for 3 hours at which time the entire system shall be checked over and if requested the owner representative shall be reinstructed.
4. The (2) additional visits and Guaranties/Warranties shall not commence until the punchlist items have been satisfied. Owners use of the pools does not constitute acceptance nor does it place the warranties in effect.
5. Each contractor is expected to punch out their own work as they go. Punch list should not included items omitted or changed.
6. As-builts along with extra tile or spare parts shall be provided at the time of start up. The as-builts shall clearly indicate the as-built condition with exact dimensions off of the inside of the pool where piping and or materials lay below the pool and or deck.
7. A ledger with time line and manufacturers name shall be hung on the wall with a schedule of when and where regular maintenance should occur. The maintenance procedure must be outlined and sandwiched between (2) 18" X 24" X ¼" thick laminate. Listing shall also include specific information related to future maintenance as well as any manufacturer or type of product to be used in future maintenance.

F. All equipment shall be clearly labeled in the filter room with black plastic signage with white lettering and numbers. The numbers shall correspond with the instructions. Signs shall state FILTERS with SQUARE FOOTAGE AND RATE, EACH FILTER PUMP WITH SIZE (HP) VOLTAGE, ALL PUMP DESCRIPTIONS WITH HORSEPOWER VOLTAGE AND PHASE, CHEMICAL PUMPS AND FEEDERS, CHEMICAL CONTROLLERS, ULTRA VIOLET UNITS AND CONTROLS, ULTRAVIOLET REACTOR (with lamp model no), POOL OXYDIZER SYSTEM, ELECTRICAL CONTROL PANELS, DECK DRAIN OVERFLOW CONTROL RINSE PANELS, CONTROL PANELS, FLOW METER AND SADDLE, EXCHANGERS or BOILERS WITH BTU'S AND WHAT THEY HEAT, BY-PASS VALVE, FILTER FLOW CONTROL VALVE, BACKWASH VALVE, POOL DRAIN VALVE and any additional items requiring identification. Signs shall be 3" X 8" White with black letters.

G. Any caution signs unless stated otherwise shall be custom made with minimum ½" vinyl lettering mounted on white ¼" plexiglass mounted as directed by the owner. All safety lettering shall be in red on a white background with all notes related to operation in black lettering on a white background. Caution signs shall be as described in another section.

H. Provide detailed shop drawings of the items of equipment being provided, indicating the dimensions, material and characteristics of the filter tanks, lining, exterior face piping, internal manifolds and laterals, and filter media.

I. Provide a complete set of operating instructions, embracing the operational functions and recurring maintenance processes involved in connection with the complete filtration and chemical treatment system. Dry fit equipment in filter room and verify with pool operator the placement of all equipment especially chemical storage and controller location.

1.14 WARRANTY:

A. Standard one-year contractual warranty for the project shall apply to all work of this section unless stated otherwise. All warranties shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the Pool and Systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.

1. Pool structural tank - Three (3) years against defects in material or workmanship. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
2. Pool Tile – 25 year Warranty by the Manufacturer with a minimum of Three (3) years against defects in material or workmanship by the Pool Contractor. Warranty shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the tile and systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
3. Pool Filter - Fifteen (15) years against defects in material or workmanship. Warranty shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the filter and filter related systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor and the manufacturer hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
4. Electrical Controls - Three (3) years held joint between the electrical installer and supplier to repair and or replace labor and material any or all components at no cost to the owner from the date of install.
5. All other construction, deck, water features and filtration equipment - One (1) year against defects in material or workmanship. All warranties shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the Pool and Systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
6. No warranty as stated above, herein or implied shall be Pro-Rated with all warranties being held joint by the Pool Contractor and the Manufacturer.

B. The pool equipment supplier/pool contractor shall guarantee that the equipment to be furnished is of the correct capacity, that the various parts are designed to operate correctly and in conjunction with each other and operated in accordance with his instructions, the system will perform the prescribed intended functions correctly, the water entering the pool will be clear, bright, free from suspended matter visible to the unaided eye, and will be sanitary to the satisfaction of all authorities having jurisdiction.

C. Filter tanks piping, pool system piping, valves and accessories shall include a three (3) year warranty and shall be repaired or replaced at no cost to the owner for labor or materials during the warranty period.

PART 2 PRODUCTS

2.01 FILTER WATER INLETS AND GUTTER GRATING:

A. It is the intent of these documents to achieve overflow through the Gutter System and in walls skimmers to achieve cleaning without discharging to waste except when cleaning or draining. Products purchased on the open market must be delivered and received by the Pool Contractor to the project in their original containers.

B. Where piping or fittings penetrate floor or walls furnish and install no leak flanges around all fittings 1 1/2 times the diameter of the fitting. All primary feed lines especially the return line shall have 45 degree bends at least 5' before the connection to the main line. Synko- flex SF-302 preformed plastic Adhesive Waterstop, by the Henry Company, meets Federal Specifications SSS-210 and Certified to NSF ANSI/APSP-16 for use in potable water is also an approved no leak seal around pool tank penetrations.

C. Gutter shall be covered with Lawson Aquatics or Recreation Supply grating as indicate on the drawings.

D. Parallel Grating and PVC angle shall be White Gutter grating and shall cover the entire perimeter of the gutter. All edges shall fit flush and smooth with no sharp edges and all grating parallel and square to the pool and deck. The grating shall be supported in accordance with the Manufacturers maximum support and sit on a PVC angle. The angle is used to allow the grating to sit flush with adjacent surfaces and to allow the installation to true all areas that may have not been install true and level around the perimeter. There shall not be any gaps in the angle against the tile at either the edge of the pool or at the deck. White Angle shall be bedded in caulking equal to Deck O seal to seal all gaps around the perimeter of the pool. All edges and ends shall be supported in accordance with the Manufacturers technical specifications. Spacing of bars shall be true and consistent around the entire perimeter.

F. The system shall consist of Radial Supports running parallel to the trench. The Radial Supports are secured by stainless steel fastener, plastic anchor and stainless steel screws. All stainless is grade 316. The Radial Supports are used to accept the 24 inch long Radial Grate Strips that interlock end to end. The radial Grate Strips are engineered to flex sideways to form any radii down to 41/2 foot inside radius.

G. The Radial Supports provide the strength for the system and keep the gap between the Grate Strips uniform. The overall height of the finished grating system is 1.0". The Radial Grate Strips are 5/8" wide with the Radial Supports providing a consistence space between them of 3/8". The system therefore provides 37.5% open area for water flow. Both the Radial Supports and Radial Grate Strips are made of a high grade PVC, UV stabilized, low heat absorption with a PSI in excess of 1,200 with flexible strength. The PVC has been tested and passed for 750 hours UV Stability under ASTM G-154.

H. The top surface shall have a raised diamond ridge design to create good friction, wet or dry. ASTM C-1028. The engineered design of the system and the PVC material specifications used mean that for all widths, the grates will not deflect more than 0.20 inches. Load to failure for all widths is in excess of 1,000 pounds and failure was by deforming. Deflection at 200 pounds is only 0.059" for 8 inch widths and up to 0.159" for 24 inch under ASTM E-661. Deflection at 200 pounds for the 21 inch width is 0.11".

I. Sections of U.V. stabilized PVC parallel grating, with a depth of 1.0". Components must meet ASTM G-154 standards, which require finished products to withstand 750 hours U.V. exposure. The top surface shall have a raised, non-slip diamond ridge pattern to meet the static coefficient

of friction, while wet or dry, of ASTM E-C-1028. The space between the pieces shall not exceed 0.375" and provide a minimum of 35% open area per foot to allow unrestricted water flow. Grating shall also meet or exceed ASTM E-661, which states allowable deflection at 200lbs and load to failure criteria. All grating is to be secured with 316 stainless steel hardware as supplied by manufacturer. Radius sections of grating must be on-site adjustable to conform to the constructed profile of the pool. Compliance with ASTM standards listed must be documented and accompany submittal data.

1. Grating shall be cut to follow the profile of the gutter and the shape of the pool. Imbed a PVC angle below the grate to finish the edges of the grating and to level out the gutter. The system shall consist of Radial Supports running perpendicular to the trench. The Radial Supports are secured by stainless steel fastener, plastic anchor and stainless steel screws. All stainless is grade 316. The Radial Supports are used to accept the Radial Grate Strips that interlock end to end. The radial Grate Strips are engineered to flex sideways to form any radii down to 1.37m (4 1/2') inside radius. The Radial Supports provide the strength for the system and keep the gap between the Grate Strips uniform.
2. The overall height of the finished grating system is 2.54cm (1.0"). The Radial Grate Strips are 1.58cm (5/8") wide with the Radial Supports providing a consistence space between them of 9.5mm (3/8"). .
3. Both the Radial Supports and Radial Grate Strips are made of a high grade PVC, UV stabilized, low heat absorption with a PSI in excess of 1,200 with flexible strength. The PVC has been tested and passed for 750 hours UV Stability under ASTM G-154. The top surface shall have a raised diamond ridge design to create good friction, wet or dry. ASTM C-1028.
4. The engineered design of the system and the PVC material specifications used mean that for all widths, the grates will not deflect more than 0.20 inches. Load to failure for all widths is in excess of 1,000 pounds and failure was by deforming. Deflection at 200 pounds is only 0.059" for 8 inch widths and up to 0.159" for 24 inch under ASTM E-661. Deflection at 200 pounds for the 21 inch width is 0.11".

J. The filter water supply piping shall be rigid PVC Schedule 80 NSF Approved for potable water. Contractor shall install piping below the pool floor and bedded in clean sand around the outside and under the pool. Contractor is responsible for maintaining pressure on all circulating piping until the pool floor and pool deck have been placed. It is the sole responsibility of the Pool piping contractor and or Pool Contractor to maintain the integrity of all recirculating piping. Inlet fittings shall be constructed of 2" ABS Floor inlet Starite Model #08417 white in color.

K. Furnish and install Hayward Model No. SP-1022 1 1/2" inlet fitting with SP-1419 directional inlet fittings in the side walls and 2" Sta Rite PVC floor inlets Model No. 08417 . All supply piping shall be rigid PVC Schedule 80 NSF Approved for potable water connected to inlets. Contractor is responsible for maintaining 10# min. of pressure on all circulating piping until pool deck has been placed.

L. Furnish and install H2O Poly Jet for the bench jets. Model Poly Gunite Jet Assembly No. 4062009 with 2" X 1 1/2" air with gunite niche #4062013 and #4062122 Stainless steel escuteon with #4062118 dual spinner.

M. E stop with Low voltage switch, timers and all hookups by Electrical contractor. Timers shall be 7 day programmable.

N. Furnish and install Hayward Model No. SP 10-82 Skimmers with 2" connections and (2) square lids with built in thermometers. Recreonics Model No. 56-128. Skimmer to be constructed of cycolac with square cover and weir. Skimmer to be completely encased in the pool wall material.

D. Where piping or fittings penetrate floor or walls furnish and install no leak flanges around all fittings 1 1/2 times the diameter of the fitting. All primary feed lines especially the return line shall have 45 degree bends at least 5' before the connection to the main line. Synko- flex SF-302 preformed plastic Adhesive Waterstop, by the Henry Company, meets Federal Specifications SSS-210 and Certified to ANSI/NSF 61 for use in potable water is also an approved no leak seal around pool tank penetrations.

E. Gutter shall be covered with DuraTech HDPE Poly Grate grating by poolequip as indicate on the drawings.

F. Parallel Grating with angle shall be as indicated by each manufacturer as standard grating. All Color choices/samples shall be presented separately in conjunction with all color choices as indicated elsewhere in these documents. Gutter grating shall cover the entire perimeter of the gutter. All edges shall fit flush and smooth with no sharp edges and all grating parallel and square to the pool and deck. The grating shall be supported in accordance with the Manufacturers maximum support and sit on a bearing angle and stiffeners. The angle is used to allow the grating to sit flush with adjacent surfaces and to allow the installation to true all areas that may have not been install true and level around the perimeter. Grating shall be uniform and there shall not be any gaps in the angle against the tile at either the edge of the pool or at the deck. Angle shall be bedded in caulking equal to 100% silicone or Deck O Seal to seal all gaps around the perimeter of the pool. All edges and ends shall be supported in accordance with the Manufacturers technical specifications. Spacing of bars shall be true and consistent around the entire perimeter.

G. The system shall consist of Radial Supports running parallel to the trench. The Radial Supports are secured by stainless steel fastener, plastic anchor and stainless steel screws. All stainless is grade 316. The Radial Supports are used to accept the 24 inch long Radial Grate Strips that interlock end to end. The radial Grate Strips are engineered to flex sideways to form any radii down to 41/2 foot inside radius. The Radial Supports provide the strength for the system and keep the gap between the Grate Strips uniform. The overall height of the finished grating system is 1.0". The Radial Grate Strips are 5/8" wide with the Radial Supports providing a consistence space between them of 3/8" (max). The system therefore provides 37.5% open area for water flow. Both the Radial Supports and Radial Grate Strips are made of a high grade PVC, UV stabilized, low heat absorption with a PSI in excess of 1,200 with flexible strength. The PVC has been tested and passed for 750 hours UV Stability under ASTM G-154.

H. The top surface shall have a raised diamond ridge design to create good friction, wet or dry. ASTM C-1028 and ASTM D2047 wet. The engineered design of the system and the PVC material specifications used mean that for all widths, the grates will not deflect more than 0.20 inches. Load to failure for all widths is in excess of 1,000 pounds and failure was by deforming. Deflection at 200 pounds is only 0.059" for 8 inch widths and up to 0.159" for 24 inch under ASTM E-661. Deflection at 200 pounds for the 21 inch width is 0.11".

I. Sections of U.V. stabilized PVC parallel grating, with a depth of 1.0". Components must meet ASTM G-154 standards, which require finished products to withstand 750 hours U.V. exposure. The top surface shall have a raised, non-slip diamond ridge pattern to meet the static coefficient of friction, while wet or dry, of ASTM E-C-1028. The space between the pieces shall not exceed 0.375" and provide a minimum of 35% open area per foot to allow unrestricted water flow. Grating shall also meet or exceed ASTM E-661, which states allowable deflection at 200lbs and load to failure criteria. All grating is to be secured with 316 stainless steel hardware as supplied by manufacturer. Radius sections of grating must be on-

site adjustable to conform to the constructed profile of the pool. Compliance with ASTM standards listed must be documented and accompany submittal data.

1. Grating shall be cut to follow the profile of the gutter and the shape of the pool. Imbed a PVC angle below the grate to finish the edges of the grating and to level out the gutter. The system shall consist of Radial Supports running perpendicular to the trench. The Radial Supports are secured by stainless steel fastener, plastic anchor and stainless steel screws. All stainless is grade 316. The Radial Supports are used to accept the Radial Grate Strips that interlock end to end. The radial Grate Strips are engineered to flex sideways to form any radii down to 1.37m (4 1/2') inside radius. The Radial Supports provide the strength for the system and keep the gap between the Grate Strips uniform and allow 1/8" gap at corners for thermal expansion.
2. The overall height of the finished grating system is 2.54cm (1.0"). The Radial Grate Strips are 1.58cm (5/8") wide with the Radial Supports providing a consistence space between them of 9.5mm (3/8").
3. Both the Radial Supports and Radial Grate Strips are made of a high grade HDPE, UV stabilized, low heat absorption with a PSI in excess of 1,200 with flexible strength. The PVC has been tested and passed for 750 hours UV Stability under ASTM G-154. The top surface shall have a raised diamond ridge design to create good friction, wet or dry. ASTM C-1028 and ASTM D2047.
4. The engineered design of the system and the PVC material specifications used mean that for all widths, the grates will not deflect more than 0.20 inches. Load to failure for all widths is in excess of 1,000 pounds and failure was by deforming. Deflection at 200 pounds is only 0.059" for 8 inch widths and up to 0.159" for 24 inch under ASTM E-661. Deflection at 200 pounds for the 21 inch width is 0.11". Specific standard warranty shall be 10 years.

2.02 GUTTER CONVERTERS:

A. Converters shall be located in the gutter perimeter where shown on the plans. Flanged piping connections shall be as shown and shall connect the converter piping to the balance tank.

1. Converter Boxes shall be constructed of 12 gauge 316L Stainless Steel with no leak Stainless Steel angles, stainless steel nipple and stainless steel flanges.
2. 8" flanged piping connections at each dropout and 6" for Therapy Pool.
3. Gutter piping connections shall be S.S. flange to PVC flange with stainless steel nuts, gaskets, bolts and lock washers.
4. PVC piping shall be rigid PVC Schedule 80 NSF Approved for potable water.
5. All gutter piping shall pitch +1% min. to transition points and balance tank.
6. Converters shall be installed prior to concrete walls to encase dropout box and maintain continuity of reinforcing steel behind and in front of each drop out box.
7. Open area of each dropout including grates covering all dropouts shall be 147.09 square inches.
8. All pipe ends in the gutter shall also be covered with a grate.
9. All reinforcing required to properly encase, support or make the box part of the pool construction and shall be stubbed out the back of the pool wall. The reinforcing shall encase the penetration and all materials shall properly placed around the entire box. No leak flange shall be around the perimeter of the box.

B. Convertors shall be covered with plywood and sealed so construction debris does not get into the piping system. This shall be at time of installation and through construction. Reinforcing shall be installed in front of and behind the drop out boxes. If the boxes do not remain covered the contractor will be required to place and record a camera in the piping systems to verify that debris has not collected and or taken a permanent set within the piping systems.

C. At all transitions to steps or common walls where gutter stops shall have 8" PVC with no leak flanges to interconnect all gutter sections. At the ends of each section of pipe furnish and install 1" X 1" X 1" FRP grating to protect the ends of the pipe and over dropouts.

2.03 FILTRATION SYSTEM

A. It is the intent of these specifications to describe a water filtration system for the "Pools" with all necessary items needed to comply with the intent of the information as stated herein. It is the further intent of these specifications that the filtration system shall be a complete unit from the pump through the rinse system, filter rinse system including all filter control valves and all accessories such as gauges, needle valves and sight glass or the like shall be furnished and installed by the bidding contractor. System shall not drain the Pool with the water passing thru the filters.

1. The filter offered under these specifications shall be NSF approved under the current public listing including type of media approved with. Such approval shall also be evidenced by the filter model number appearing in the current NSF Testing Laboratory Listing for swimming pool filters at the flow rate required for this project.
2. All regen filters shall rinse to sanitary and all pools shall be neutralized and drained to storm.

2.04 BASE BID

A. It is not the intention of the specifications to limit competition. The base proposal must be on furnishing the equipment and manufacturer as specified, however, any bidder may, at his option, offer a substitute or Alternate for consideration with his bid. In proposing a substitute, the project bidder is cautioned to refer to the qualifications and all information as stated herein. Any proposed substitution shall include a mechanical layout incorporating all required changes to the project. Including tank warranty, layout, tank volumes, tank sizes, tank type, tank construction as well as any linings under listed under current NSF, piping and valves and controls with interface to controls as defined herein. The cost of such changes shall be included in the price of the substitute.

1. Any such proposed system must be NSF approved in a current public listing with a universal media type such as Pearlite and comply with the State and Local Health Departments.

2.05 REGENERATIVE FILTER SYSTEM

A. General:

1. The equipment manufacturer/supplier basis for design is based on:

   AQUA REVIVAL
   1417 Racine Street
   Delavan, WI
   1-262-725-6081

2. The filter system under this section for the New Competition Pool shall be Model BSG 50T as detailed on the drawings.
3. The Filter system for the Diving Pool, Therapy Pool and Warm Water Pool shall be BSG 20T as detailed on the drawings
4. The filter system for the Existing 50 Meter Pool shall be BSG 40T as detailed on the

drawings.

B. It is the intent of these specifications to describe a filter system complete with all accessory items supplied and warranted by one manufacturer.

C. The primary components of the systems consist of the main filter tank, flex tube filter elements, element assembly, media revival mechanism, vacuum or flow transfer systems, tank sight glass, influent, effluent, and revival loop sight glasses; valves and pressure transducers, RMF system controller.

D. All components and related subassemblies, to the extent possible, shall be factory assembled and tested before shipment.

2.06 FILTER SYSTEM CAPACITY

A. The New Competition Pool has 920,000 gallons with the filter system capacity of filtering the pool in 6 hours or less. The system flow rate shall be @2,556 GPM shall consist of (1) Model No. BSG **50T** Aqua Revival® filter tank with a total effective filter surface area of 1,488 square feet and operate at a rate of 1.9 GPM/SQFT. Tank is 88" tall X 50" diameter with 736 gallons and shipping weight of 1,992#.

B. The Existing Competition Pool has 612,000 gallons with the filter system shall be capable of filtering the pool in 6 hours or less. The system flow rate shall be @1,700 GPM and shall consist of (1) Model No. BSG **40T** Aqua Revival® filter tank with a total effective filter surface area of 940 square feet and operate at a rate of 2.0 gallons per minute per square foot of filter area and less. Filter is 87.5" tall X 40" diameter with 470 gallons and shipping weight of 1,425#.

C. The Diving Pool has 144,000 gallons filter system has shall be capacity of filtering the pool in 6 hours or less. The system flow rate be 400 GPM and shall consist of (1) Model No. BSG **20T** Aqua Revival® filter tank(s) with a total effective filter surface area of 200 square feet and operate at a rate of 2.0 gallons per minute per square foot of filter area. Filter is 76" tall X 20" diameter with 109 gallons and shipping weight of 479#.

D. The Therapy Pool has 24,150 gallons with the filter system capable of filtering the pool in 60 minutes or less. The system flow rate be 400 GPM and shall consist of (1) Model No. BSG **20T** Aqua Revival® filter tank(s) with a total effective filter surface area of 200 square feet and operate at a rate of 2.0 gallons per minute per square foot of filter area. Filter is 76" tall X 20" diameter with 109 gallons and shipping weight of 479#.

E. The Warm Water Pool has 6,746 gallons with the filter system capable of filtering the pool in 60 minutes or less. The system flow rate be 400 GPM and shall consist of (1) Model No. BSG **20T** Aqua Revival® filter tank(s) with a total effective filter surface area of 200 square feet and operate at a rate of 2.0 gallons per minute per square foot of filter area. Filter is 76" tall X 20" diameter with 109 gallons and shipping weight of 479#.

F. The filter area shall be provided as specified and as listed in the current Public Listing in NSF-Standard 50 to provide the specific filter rate and media type.

G. Filter system shall be designed to maximize sq. Ft. of filter area at a rate of 1.9 to 2.0 while minimizing operating weight. Systems that operate more than 11 lbs. Per Sq. Ft. of filter area shall not be considered.

2.07 FILTER TANKS

A. The filter tanks shall have a side shell less than or equal to 50 inches tall, ASME Code stamped for 50 psi working pressure and hydrostatically tested per ASME Code Section VIII. All material shall be Type 304L or dual rated 304/304L Stainless steel. Side hatches or blind flanges are not acceptable.

B. All welding shall be performed by certified Code welders. All welds to be neat in appearance, free from slag and other defects, ground and polished to minimum 63 RMS. All tanks must be passivated post hydrostatic test.

C. All tanks must have four (4) legs. Tank legs shall be constructed of 304/304L stainless steel. Bearing plates shall be a minimum 1/4" type 304/304L stainless steel. Each bearing plate shall have one (1) 5/8" drilled holes to secure to the floor with the 1/2" x 4"-1/2" stainless steel concrete anchors provided.

D. The tank cover flange and required and shall be bolted to the shell flange with ASME Section VIII approved hardware.

E. Tank shall incorporate Van Stone (ANSI) connections for filter influent, effluent, drain; media vacuum or pressure transfer piping, ASME viewing window (sight glass). NOTE: Tanks with blind threaded pad flanges for attaching filter influent, effluent, or drain piping shall not be considered.

F. The tank shall include brackets for mounting of RMF system controller.

G. The tank shall be cleaned to NSF 50 without disassembling the tank.

2.08 LININGS AND COATINGS

A. Tanks shall be manufactured such that interior and exterior linings and coatings are not required.

2.09 INTERNAL COMPONENTS

A. The filter shall consist of flex tube elements, filter tube sheet, stainless steel lift shaft, and internal flow diversion assembly.

B. The filter elements shall be flexible tubes that provide the support structure for the media. The outer wall of each element shall be fabricated of multi-filament high strength polyester braid. Each element shall have an internal T304 stainless steel spring, which acts as a support structure for the braided filament.

C. The filter element tube sheet shall be fabricated of 304 stainless steel and provide both support for the top of the element assembly.

D. The tube sheet hold-down plate shall be fabricated of 304 stainless steel and shall provide a water tight seal to prevent media from escaping the filter tank.

E. All stainless-steel wetted fasteners shall be 304 stainless steel. NOTE: Systems utilizing rigid elements with replaceable filter septum shall not be considered.

2.10 REVIVAL MECHANISM CLEANING

A. The media revival mechanism shall include a pneumatically operated, intrinsically safe cylinder mounted externally on the filter tank head. The cylinder is alternately pressurized then

depressurized causing the connected filter element assembly to move in a downward then upward fashion. This movement shall provide the means of dislodging the media and accumulated solids, which then recoat the filter elements.

B. The filter system shall be designed such that when the internals of the tank are cleaned the tank is not opened, either at the body and cover flange or with shell or head hatches or flanges. Cleaning mode shall be automated with integral air scouring that does not require an auxiliary blower.

2.11 MEDIA TRANSFER SYSTEM

A. A vacuum or positive flow transfer system shall be provided to allow the recharging of media into the filter for either bag or bulk media.

B. The manufacturer shall provide all necessary pipe, fittings, and hardware for field plumbing of the vacuum or positive flow transfer system.

2.12 AUTOMATIC CONTROLLER

A. The automatic controller shall be of the capacitive touch screen type, with a graphical user interface and password protected in layers to provide general operation separate from system setup screens.

B. The automatic controller shall provide total control of the system's filtration and regeneration cycles and provide all necessary equipment interlocks and timing mechanisms to execute the filter program.

C. The controller shall include an adjustable pressure transducer, factory set to 50 psi. The switch shall stop the recirculating pump and close the pneumatic valves if air pressure falls to 50 psi.

D. The controller shall contain a microprocessor that will activate the following functions of the system:

1. Revival cycle/manual or automatic.
2. Precoating of the filter elements.
3. Stopping and starting the main recirculating pump.
4. Opening and closing of pneumatically operated valving.
5. Vacuum or positive flow media transfer system.
6. Heater cool down delay.
7. Auxiliary contacts to interlock chemical control or other equipment.
8. Parameter settings to activate continuous, intermittent bump cycle for flex tube cleaning.

E. The controller panel shall display the following functions:

1. Media health.
2. Filter status.
3. Precoat status.
4. Recirculating pump status.
5. Vacuum or positive flow media transfer pump status.
6. System power.

F. The controller enclosure shall be stainless steel, rated NEMA 4x, and approved to UL 1081 Standard for Swimming Pool Pumps, Filters, and Chlorinators or UL 508, provided a metallic enclosure rated to Nema 4x is utilized.

G. The RMF system controller will provide signal power to the main recirculating pump motor starter. The unit is required to be a variable frequency drive (VFD) and is to be installed with control wiring. System controller shall consist of Invertex Pump drives for each filter pump.

H. The RMF system controller shall be 120V, 1 phase, 20amp rated and shall be UL 1081 labeled. Systems without programmable, automatic bump/regeneration/filter modes shall not be considered.

2.13 FLOWMETER

A. System controller shall interface directly with a Georg Fischer brand digital flowmeter 3-2551-P1-XX and provide a direct readout on the capacitive touch screen if the parameters are set to display flow rate.

2.14 AIR COMPRESSOR

A. The system will require one (1) air compressor per filter. The following is the minimum requirement: 6-gallon tank, 115v, 1 phase, 10-amp, 2.6 CFM @ 90psi, air pressure gauge, pressure relief valve, pressure switch, air filter, tank drain.

2.15 PNEUMATIC ACTUATORS

A. Each filter shall include Georg Fischer or Colonial/Bonomi valve pneumatic actuators for one (1) effluent valves, and one (1) precoat valve.

B. The actuators shall be double acting.

C. The actuators shall include two (2) 1/4" FPT ports for open/close connections. Flow control valves with quick connect fittings shall be provided at each port to allow speed control adjustment for the open/close function of the actuators.

2.16 SOLENOID VALVES

A. Each filter shall include three (3) 24v single solenoid, 4-way pneumatic valves mounted on a multi-station manifold for the operation of the pneumatic actuators and bump mechanism.

B. The solenoid valves shall include lighted DIN connectors.

C. The solenoid valves shall be factory lubricated and shall not require any field lubrication.

D. The solenoid valves with multi-station manifold shall be located on the bottom of the automatic controller, factory wire and include quick connect fittings for the attachment to the pneumatic actuators and bump mechanism.

E. The solenoid valves shall be SMC Series SY 7000.

2.17 VALVES

A. All valves 3"-12" shall be constructed with Glass-filled Polypropylene Compatible with ANSI and DIN flanges. Internal components include PVC, EPDM, with a shaft made from 304 Stainless Steel (non-wetted).

B. Valves shall be butterfly valves and shall be provided for the influent, effluent and precoat lines.

2.18 SYSTEM VALVES

A. Each Aqua Revival® filter shall include five (5) system valves to facilitate system fill after media recharge, precoat/regeneration, influent and effluent for filtering and media dump/drain valve.

B. The precoat/regeneration and effluent valves shall be butterfly type with pneumatic actuators per 2.11

C. The system fill valve shall be butterfly type with lever operator and shall be the same size and the precoat/regeneration valve.

D. The shall be butterfly type with lever operator.

E. The dump/rinse valve shall be butterfly type with lever operator.

2.19 MAIN DRAIN REQUIREMENT

A. A sump pit or standpipe is required for dumping spent media and rinsing tube elements.

B. To prevent overflow, the sump or standpipe drain piping should be sized for 300 gpm capacity.

C. If drain piping cannot be sized for 300 gpm, or if the sewer is at an elevation higher than the filter tank drain, use a sump supplied by others that will accommodate the volume of the filter and receive gravity flow from the bottom of the filter.

2.20 PACKAGING

A. All tanks shall ship in the upright position.

B. All tanks shall be shrink-wrapped to prevent damage during transport.

C. The components shall be carefully packaged in an enclosed wooden crate to prevent damage during transport.

2.21 MEDIA

A. Media shall be expanded perlite with a median particle size of 37 microns. Percentage retained on a +150 Tyler Mesh shall not be less than 8% or more than 25%. Darcy permeability shall be between 1.2 – 1.85.

B. The media shall contain no more than one-tenth of one percent (.001) of crystalline silicate.

C. The media shall be certified by Manufacturer for use in Aqua Revival® filter. The media shall be NSF50 listed and listed for use in aquatic filters.

D. The preferred media shall be Harborlite.

2.22 FILTER CLEANER

A. Each Aqua Revival® filter includes one (1) charge of chemical for cleaning and degreasing

2.23 RECIRCULATION PIPING AND FITTINGS:

A. The Contractor shall furnish and install new piping and valves for each beginning at each of the main drain sumps, gutter through the to the balance tank, gutter to waste, pump suction line, pump discharge to filter, pump to waste, filter effluent through boiler/exchanger, filter backwash to waste and overflow and drain pump to waste.

B. In addition to the material hereinafter indicated to be furnished by the equipment supplier/contractor, the Pool Contractor shall furnish all other material and parts necessary to complete the installation.

C. All pipe and fittings shall be Schedule 80 PVC with all fittings being molded. Piping five (5) feet on both the influent and effluent lines of the heat system which shall be stainless steel, copper or CPVC NSF Approved. Connections shall be flanged with stainless steel nuts and bolts and lock washers.

D. Piping arrangement shall be in accordance with the intent of the drawings and with equipment manufacturer's recommendations.

E. All chemical feed equipment, tubing and Schedule 40 sleeves shall be properly supported so it does not sag. Piping and chemical control sample streams shall be installed in strict accordance to the manufacturers installation instructions.

2.24 FACE PIPING - EXTERNAL:

A. External face piping shall be Schedule 80 PVC pipe and fittings. Flanges shall be located so as to allow for easy dismantling of face piping. All fittings shall be molded and solvent cemented. No bolt on valves or operators shall be permitted.

B. Piping shall be drilled and tapped where necessary to accommodate gauge tubing connectors. Manufacturer supplied combination gauges shall be furnished and installed for each tank. Filter face piping as with all floor supported piping shall be supported to the floor with hot dipped galvanized or St. St. unistrut,

1. Concrete to unistrut shall have channel capping strip #20E-52000, caps AIC-EC with channel fittings of heavy duty plastic post base #20PV-5853HD by Aikinstrut for all unistrut that touches the floor or concrete surface.

C. Filter face piping shall be supported on each side of each tank connection. All face piping shall be supported independent of each of the filters.

2.25 FILTER SYSTEM PACKAGING:

A. All filter piping and valves shall be factory assembled and knocked down into sub-assemblies for shipment.

B. The components shall be carefully packaged in a totally enclosed wooden crate to prevent damage during transport.

C. Filters shall be treated as furniture. They shall be protected from the time they arrive on site and through the installation. Scratches are not acceptable.

2.26 SYSTEM ACCESSORIES:

A. PRESSURE GAUGE: One (1) 4" dial Marsh type 1CP BM threaded, 0-60# pressure gauge for installation with snubber and Crane #88 needle valve on the discharge side of the recirculating pumps.

B. COMPOUND GAUGE: One (1) 4" dial Marsh type 3CP BM threaded, -30 0 30" vacuum gauge for installation with snubber and Crane #88 needle valve on the suction side of the pumps.

2.27 THROTTLING VALVES:

A. Two (2) Flanged mounted gear operated throttling George Fisher valves (as specified in another section) to be located on pumps discharge lines. One for filtration and one for pump to waste.

B. Provide all swimming pool filtration/recirculation equipment and necessary work to completely install the specified equipment as indicated on the drawings and specified herein, including: Assembly and installation, Piping and valves, Filter system with all inter related piping.

2.28 PUMPS, MOTORS AND ELECTRICAL

A. Competition Pool Pumps and Motors to be furnished and installed are (2) end suction close coupled, straight centrifugal pumps and motors, NSF Approved. The main filter pump(s) shall be close coupled 3801 Series Aurora pump and motor Model No. 6X8X11A with a capacity of 2,556 GPM against a total dynamic head of 70 feet. Each of the motors supplied shall be a 60 HP, 3 phase, 480 voltage, 60 cycle, 1800 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, TEFC enclosure, EPDM, low starting current, normal torque induction motor. Motor shall be premium efficiency and drive compatible. With Mermade strainers.

B. Existing Competition Pool Pump and Motor to be furnished and installed is (1) end suction close coupled, straight centrifugal pumps and motors, NSF Approved. The main filter pump shall be close coupled 3801 Series Aurora pump and motor Model No. 6X8X9.5 with a capacity of 1,700 GPM against a total dynamic head of 75 feet. Each of the motors supplied shall be a 50 HP, 3 phase, 480 voltage, 60 cycle, 1770 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, , TEFC enclosure, EPDM, low starting current, normal torque induction motor. Motor shall be premium efficiency and drive compatible. With Mermade strainer.

C. Therapy Pool filter pump and motor to be furnished and installed is (2) Two 15HP end suction close coupled, Aurora Model No. 3801, 3X4X9.5, 400 GPM against a total dynamic head of 70 feet. Each of the motors supplied shall be a 15 HP, 3 phase, 480 voltage, 60 cycle, 1800 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, TEFC enclosure, EPDM, low starting current, normal torque induction motor. Motor shall be premium efficiency and drive compatible. With Mermade strainers. Pump to be NSF Approved

D. Warm Water Pool filter pump and motor to be furnished and installed is (2) Two 15HP end suction close coupled, Aurora Model No. 3801, 3X4X9.5, 400 GPM against a total dynamic head of 70 feet. Each of the motors supplied shall be a 15 HP, 3 phase, 480 voltage, 60 cycle, 1800 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, TEFC enclosure, EPDM, low starting current, normal torque

induction motor. Motor shall be premium efficiency and drive compatible. With Mermade strainers. Pump to be NSF Approved

E. Warm Water and Therapy Pool Jet pumps. Jet pumps to be furnished and installed is (2) Two 5HP end suction close coupled self priming pumps, EQ Series Model No. EQK 500, 6" X 4", with TEFC JMZ frame pumps with integral strainer and spare baskets. Flow shall be 200 GPM for the Warm Pool and 240 GPM for the Therapy Pool. Each of the motors supplied shall be a 5 HP, 3 phase, 480 voltage, 60 cycle, 3450 RPM, low starting current, normal torque induction motor. Motor shall be premium efficiency and drive compatible. Pump to be NSF Approved

1. Hookups of each of the motors to be by the Electrical Contractor.
2. Motors shall have an efficiency of 90% or greater and drive compatible.
3. Pumps to be coated and NSF Approved.

F. Furnish to Division 26 contractor electrical components to be installed with each of the motors as listed below the following but not limited to: The Pool Automation system shall be shop manufactured and assembled by the Manufacturer of the Automation System. Provide DDC control sequence of proposed equipment; provide temperature sensor location, and wiring diagram for all related equipment. Automation System shall be compatible and integrated into the owners energy management system.

G. Pump(s) shall be mounted vertically or horizontally. All gauges shall be liquid filled compound gauges constructed of stainless steel bourbon tube type with 2 ½" stainless steel case with white scale and black numbers. Series 700 SS/SS 30 in Hg vac. to 60 psi stainless steel movement and back plate. SS movement with 316 SS tube and socket. Gauges shall be calibrated in accordance with ANSI B40. Scale shall be selected for pointer to operate at mid scale. Each compound gauge shall be connected to the suction and discharge of each pump(s) and strainer(s). A stainless steel snubber No 872-11, stainless steel tube and socket Type FFG No. 740-11 S.S. needle valve as manufactured by Trerice.

H. Horizontal Close Coupled end suction centrifugal pumps by Pentair and or Aurora Model No. 3801.

1. The Contractor shall supply materials, equipment and labor to furnish, install and test the pumping system complete with the pumps, motors, mounting bases, piping, valves and accessories, as indicated on the contract drawings and following the instructions specified by the manufacturer. The Contractor shall ensure that the pumps and motors are properly installed and checked in accordance with the standard of the Hydraulic Institute and there shall be no undue pipe strain transmitted to the pump casing.
2. The pump shall be a centrifugal horizontal close-coupled end suction pump, suitable for operation with a VFD, Pentair Aurora Model 3801 or pre-approved equal with following characteristics and materials of construction:
3. Pump volute shall be Ductile Iron (ASTM A536) with integrated foot to support the volute and allow back pullout feature. Pump shall include gauge tappings at the suction and discharge flanges and vent and drain tappings at top, bottom and side of the volute. Simple design with no center drop out spacer coupling needed to disassemble the rotating elements without disturbing the casing or suction, the discharge pipping, and the electrical motor connections.
4. Impeller shall be of enclosed type Stainless Steel (ASTM A743 Type 316), finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. Impeller shall be dynamically balanced to ANSI/HI 9.6.4 balance grade G6.#, keyed to the shaft, and fastened with a washer, gasket and cap screw.

5. Pump internal design shall include a self-flushing Mechanical seal with Stainless Steel (ASTM 303) metal parts, Buna-N elastomers parts, Ceramic seat and Carbon washer suitable for continuous operation at 225°F (107°C). Pump shall be equipped with a Steel (AISI C1045) shaft and fitted with a replaceable Stainless Steel 316 ASTM shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.
6. Pump seal plate and motor bracket shall be of a two piece design, and shall provide an adequate area for internal recirculation of the pumped fluid around the sealing medium.
7. Pumps shall be able to handle 175 PSI working pressure.
8. The pump and motor shall be able mount on a concrete foundation base using bolt or lag screws into threaded inserts to allow removal of the drive motor without disturbing the pump liquid end or the piping.
9. Motor(s) shall be a NEMA configuration in accordance with the latest NEMA Standards and shall have a sufficient horsepower rating to operate the pump at any point within the manufacturer's recommended operating range on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency.
10. Each centrifugal pump furnished under these specifications shall be tested at the factory to Verify Individual Performance (VIP). Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards. Pump manufacturer warranty shall be for a period of five (5) years from the date of installation or start-up, or for five (5) years after the date of shipment, whichever comes first.

I. All pumps shall have flanged structural fiberglass eccentric connections or stainless steel flanged flexible eccentric discharge connections with hypalon spools with stainless steel internal or external wire or in line EPDM rubber matching the return line with 1" deflection with drilled flange. All strainers shall have eccentric increasers from the strainer to the pump to match pump suction. Connections for flexible connectors shall be full face 125# to 150# flanges manufactured into the fitting. As with all pumps connectors shall match pipe suction and discharge pipe size, not pump size unless they match pump and return line size. Flex-hose, Metraspere or National Line.

J. All pumps shall have double door check valves of epoxy coated cast iron body, 316L springs, EPDM seat, wafer style, T 316 stainless steel doors, T 316 stainless steel pin and stop. As with all pumps match pipe discharge pipe size, not pump size, return line size. DeZurik or accepted equal.

K. All pump suction in balance tank shall have a PVC anti vortex plate in the balance tank flange mounted to floor of balance tank along with gutter line flange mounted to floor of balance tank. Gutter line shall have 3/8" air bleeder drilled into gutter line before it turns down to bottom of tank. Install all housekeeping pads below pumps with Stainless Steel anchor bolts, washers and nuts. All piping to allow for ease of service to be true level and plumb. This contractor shall supply complete drawings and printed instructions for the installation and operation of all equipment specified herein and shown on the plans.

L. Furnish and install (2) Float operated sump pumps for deck drain overflow sump piped into the sanitary sump. Pumps shall be Submersible 2" discharge heavy duty non-clog sump pumps with cast iron housing ball bearings stainless steel shaft and mechanical seal.

1. Pumps shall be Submersible Sewage type float operated sump pumps with NEMA 4X control panel for each set of pumps fed from the control panel:

a. Underdrain sump pump (1) 1HP 50-75 GPM@35'HD drop in pump for new Inspection Sump.
b. Deck drain overflow sump pumps (2) 1HP, 60-75 GPM@35'HD
c. Pump pit sump pump 1/2HP, 110V/1Ph, 30-40 GPM@32'HD

2. Sump pumps shall be Weil, Marlow or Hydromatic pumps and NEMA 4X FRP control panel with level controls, alarm and timers. Pump(s) shall have 2 inch NPT integral vertical discharge and shall be capable of handling a sewage containing non-abrasive 2 inch maximum solids. The motor shall be protected by a mechanical shaft seal mounted on the pump shaft. The mechanical seal shall be constructed of silicon carbide vs. silicon carbide sealing faces. The mechanical seal shall be tensioned by an independent spring constructed of series 300 stainless steel metal components and BUNA-N elastomers. All pumps shall have check valves and ball valves to regulate flow.
3. The impeller shall be semi-open with ejector (pump out) vanes on the top of the impeller for protection of the mechanical seal and hydraulic balance. Due to design, only single plane spin balancing shall be required for smooth operation. The impeller shall be threaded to the solid series 400 stainless steel shaft. Three phase pump impellers shall be secured by a thread-locking feature which will prevent the impeller from loosening during short periods of reverse rotation as might occur when rotation direction is being verified outside the installation.
4. The casing shall be cast from ASTM A48 class 30 gray cast iron of sufficient thickness to withstand 1.5 times the shut off pressure generated by the largest impeller available for this model in accordance with current revision of the Hydraulic Institute Standards. The discharge connection shall be a standard 2 inch and 4 inch NPT suitable for direct connection to the station piping, without the use of any external fittings or adapters for vertical orientation of the discharge direction. Integral feet of cast iron shall be made a part of the casing for accurately positioning the pump suction opening at the correct elevation off the sump floor for good pump down capability.
5. The impeller, casing, bearing/seal housing and motor cover shall be of ASTM A48 Class 30 high quality cast iron for strength and long life. Silicon Bronze impeller shall be cast from ASTM B584 CA836.
6. The pump/motor shaft wetted-end shall be series 400 stainless steel. Both inner and outer surfaces of cast iron shall be electro-coat-painted with thermo-setting Acrylic baked 20 minutes at 350 degrees F., after casting are completely machined.
7. The integral motor shall be completely sealed from the environment by use of circular cross section o-rings accurately fitted into machined grooves which shall provide designed compression of metal to metal fits. The motor shall be rated for continuous duty under full nameplate load while at full submergence in the station. The motor shall be provided at the specific site conditions of 460 V, three phase as required, all shall be at 60 Hz. Three phase motors shall be protected by ambient compensated quick-trip heaters or adjustable motor circuit protectors provided in control panel. The stator winding shall be open type with class B insulation suitable for operation in clean dielectric oil for efficient heat transfer and lubrication of the ball bearings. The stator shall be a register fit into the bearing housing to ensure positive alignment, and bolted for ease of serviceability. The motor shall be provided with ball type anti-friction bearings which shall support the heavy duty rotor shaft and to handle all radial and axial loads imposed by the impeller while limiting shaft deflection at the mechanical seal faces. The ball bearings shall be designed for a life of 30,000 hours minimum. The motor shall be designed and tested to withstand an 18 day locked rotor operation without damage. Lower seals shall be constructed of Tungsten Carbide.
8. The power cable shall be sealed at the motor end as it enters the motor casing by a two part barrier to moisture intrusion. The first line of defense shall be the compression of

the oil and chemical resistant grommet which shall seal the outer jacket of the power cord. In the event that the outer jacket of the power cord should become damaged, then the second line of defense shall be the epoxy poured isolated conductors within the jacketed cable itself. The insulation shall be removed from the individual conductors and the epoxy shall be allowed to form a leak-proof seal against wicking of the power cable between the outer jacket and the insulation of the individual conductors. The outer jacket of the power cord shall be oil resistant and water resistant. The power cable shall be rated for NEC severe service "S", type "SJTOW" or "STOW".

9. Sump panel shall be duplex weatherproof 4X Panels Centri Pro Superior quality duplex liquid level controller with automatic alternation for two pump operation.
10. Each pump shall have a High level alarm warning, 2 hand-off-automatic (H-O-A) pump switches, On-off control circuit Switch, oversized magnetic contactors, Numbered terminal strip-screw type, Float Switches, Three Phase, High Level Alarm, Alternator, NEMA 4X Fiberglass Enclosure, NEMA 4X, 30 watt, flashing red light, NEMA 4X, fiberglass enclosure with gasketed, hinged door and stainless steel hardware, NEMA 4X, alarm horn -95db, Electronic pump alternator, Alternator selector switch, Lag pump start delay, Field adjustable for 208/230/460/575V, 60Hz, 115V control circuit transformer and 2 adjustable motor overload protectors.

    a. Rugged NEMA 4X construction
    b. Provides fully automatic operation for each pump. Alternates pump starting to distribute operating time.
    c. Provides extra pumping capacity in times of high inflow by energizing both pumps.
    d. Hinged door with lockable stainless steel latch for safe operation indoors or out.
    e. High level alarm circuit includes through door mounted silence switch for manual silence of alarm horn.
    f. Through door mounted alarm test switch insures proper operation of the alarm circuit without the need to open the panel
    g. 2 through door mounted pump run lights.
    h. Top mounted high intensity flashing red light provides 360 degree visibility.
    i. Pulsating, corrosion proof alarm horn.
    j. These duplex controls are factory wired for operation with three float bulbs. An easy field modification for four float bulb operation using separate "lag-on" and "alarm bulbs" is provided.
    k. Solid state pump alternator circuit displays float status for ease of installation and trouble shooting.
    l. Alternator selector switch allows a choice of automatic alternation or operation of only pump 1 or pump 2.
    m. Lag pump start delay built-in. Delays starting lag pump for 5 seconds if both pumps attempt to start simultaneously as after a power outage.
    n. Panel can be wired for a single power feed for pumps and control circuit or the control circuit can be wired to a separate power supply to insure alarm integrity in case of a tripped main breaker.
    o. Auxiliary alarm contacts provide for remote alarm connection.
    p. Entire unit is UL and CUL listed.
    q. Color coded siring, screw type terminals and plug in sockets, ensure ease of field servicing.
    r. Field wiring diagram, panel schematic and installation instructions included.
    s. Guaranteed pump submergence circuit
    t. Three phase lightning arrestor
    u. Seal fail circuit (2) - Duplex
    v. High temp. indicator with pump shutdown – Duplex

w. Special duplex seal fail and high temperature circuit 15/20GD, 15/20GX and 1GA/2GA pumps.
x. Motor circuit protectors (RB52 through 57)

11. Dewatering pump shall be dropped into the inspection sump with a chain connected to the sump pump. Furnish at least 100' of vaccum type flexible pipe and discharge into the deck drain or the storm sump in the filter room. Pump pit pump shall be piped into the backwash sump.
12. Sump shall be covered with FRP grating as manufactured by Fibergrate. Fibergrate type IFR polyester resin reinforced with fiberglass roving. Use 1" X 4" X 1" rectangular mesh to accept 300 pound load. Resins shall be fire retardant vinyl ester meeting the requirements of Class 1 rating of 25 or less per ASTM E-84 and meets the self-extinguishing requirements of ASTM D-635. Color shall be yellow. Resin shall be UV inhibited and the composite shall include a veil on all exposed surfaces. The top of the panels shall be covered with a bonded grit, baked epoxy, anti skid surface. Cut holes in grate as needed.

M. Install all housekeeping pads below all pumps with Stainless Steel anchor bolts, washers and nuts. All piping to allow for ease of service. All piping to be true level and plumb. This contractor shall supply complete drawings and printed instructions for the installation and operation of all equipment specified herein and shown on the plans.

2.29 POOL CONTROLS:

A. Coordinate all controls with the filter systems and all electrical components for this project. Division 26 Contractor to provide 300 amp, 400 amp, and 500 amp service to filter pump control panels. All conduits, junction boxes control wiring, hookups, panel mounting, interconnecting conduit and wiring for all switches, timers or the like shall be by Division 26 contractor. It is assumed that all connections rough-ins, junction boxes, grounding, bonding, conduit and installation of items below are by Division 26 contractor.

1. Filter pumps drives shall be controlled by flow meter or pressure differential
2. Filter pumps are redundant with only one pump operating 24/7.
3. All pumps must have separate start/stop and controls
4. E stop with alarm shall shut off power to jet pumps
5. Drain Pump and jet pumps do not require a VFD
7. If individual panels other than chemical controller are installed they must be complete with numbered pigtails and installed/hooked up by the supplying contractor.
8. Flow shall be indicated on the chemical controllers
9. Differential measurements set display shall be capable of displaying flow or Hz
10. All motors 1HP and larger shall be 480V/3Phase, unless specified otherwise.
11. Control panels shall provide:

a. Power for distribution
b. Starters, disconnects
c. Starters and disconnects for drain pump
d. Chlorine feed pumps
e. Filter room overflow/deck drain pumps (2) 1.5HP float operated sump pumps and power to feed
f. (5) Disconnects for Dedicated 110 for chemical controllers
g. Lockable 4X fiberglass junction box
h. Disconnects for UV systems
i. Vent fans 110V

B. Panel shall provide power and control of filter pumps manually switched by the owner every 30 days.

1. Chemical systems shall not feed in the event of no or low flow by way of the in line flow sensor wired into the chemical controller.
2. All pumps 3HP and larger shall have VFD's unless otherwise noted

C. LON Works or BACNET based communications shall be provided in the control panel so the owner can remotely monitor all functions of the equipment. For owners purposes and future service for all Drives shall be:

1. Variable Frequency Motor Controllers
2. Section 26 05 53 Identification for Electrical Systems
3. Section 26 28 13 Fuses.

D. Monitoring of the pool systems shall be compatible with the owners management system and in conjunction with their Energy Management System and provide the same readout as the chemical controller. Locations shall be as indicated on the control diagram. The owner will monitor the following with wells furnished and installed by Division 13 Contractor as located by controls contractor:

1. Pool Temperature/Hi Limit
2. Boiler #1 and #2 influent
3. Boiler #1 and #2 effluent
4. Pool(s) temperature
5. E stop off alarm
6. Competition Pool Pump 1 and 2 on/off with flow and off alarm
7. Therapy Pool Pump 1 and 2 on/off with flow and off alarm
8. Diving Pool pump 1 and 2 on/off with flow and off alarm
9. Warm Water Pool pump 1 and 2 on/off with flow and off alarm

E. Monitoring of the pool systems shall be by the owner in conjunction with their Energy Management System as installed by Controls Contractor. Pools filter systems shall operate 24/7. Chemical feed systems shall automatically control and maintain pre set levels of chemical for the pool Balanced to Langlier Saturation Index and pre set to 2 to 3 PPM chlorine with a Ph level of 7.5 and in conjunction with State required levels. 110 volt for (2) 5-24 VDC 1.5mA for flow sensor and (2) 12-24 VDC 10 watts flow monitor. All electrical and data connections to the controller shall be by the pool contractor. The owner will monitor the following in conjunction with Division 13 contractor Controls and Chemical Controller: Flow switch shall not permit chemicals to feed into pools when filter pumps are not running.

1. Pool Mixed Temperature
2. Hi Limit
3. Chlorine levels
4. Ph
5. Flow rate
6. Filter pumps off alarm
7. Filter pumps one or two operating
8. Therapy Pool filter pump flow on/off
9. Competition Pool filter pump flow on/off
9. Controller function monitoring
10. Temperature for both pools

F. Electrical Controls shall be Furnished and installed as listed below to (2) Two NEMA 4X FRP control panels, (1) for each pool with disconnect.

G. Panel shall be prewired with individual start, stop, controls and drives for all pumps. Panel shall provide disconnect for UV, Chemical controller and UV control but not limited to:

1. Furnish and install new combination start/stop and variable frequency drives. Wiring shall be wired to a numbered terminal strip for simplified identification and ease of trouble shooting. Panels shall be built in accordance with UL 1995/CAN/CSA/ No. 236-M90. Filter frequency drives shall be controlled by the flow meter, thru the Chemical Controller regulating the flow for each of the filter pumps.
2. The manufacturer must have a quality management system in place, equal to the quality assurance standard ISO 9001-2000, for the design, manufacture, and service of control systems. Standard catalog motor control centers requiring modification to meet these specifications or panels that are field assembled from pre-fabricated panels shall not be considered or accepted.
3. The Contractor shall provide a written warranty, signed by the manufacturer, agreeing to replace/repair, within warranty period, components with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required provided manufacturer's instructions for handling, installing, protecting, and maintaining panels have been adhered to during warranty period. Warranty Period shall be 1 year labor and material and provided by the Unit Manufacturer.
4. Contractor shall provide the following detail as a minimum requirement:
   a) Complete ladder type wiring diagram in AutoCAD format.
   b) Detailed sequences of operation for each controlled device.
   c) Complete bill of material listing manufacturer, model and part number for each device in excel spread sheet format.
   d) Scaled panel layout drawings in AutoCAD format
   e) Catalog cut sheets for all major components and sensors.
   f) Input and output point table
5. The Pool Automation system shall be shop manufactured and assembled by the Manufacturer of the Automation System. Arrangement of all panels shall be as shown on the Shop Drawings. All panels shall be factory assembled, internally wired, and 100% tested to verify proper operation and control sequence before leaving the factory.
6. Manufacturers must have experience in Swimming Pool Control Systems and have specific control personnel who can service the controls under emergency situations. Alternate manufactures are cautioned to follow the guidelines as indicated in the substitution section herein.
7. Certified factory drawings detailing overall panel layout, dimensions and devices.
8. Provide DDC control sequence of proposed equipment; provide temperature sensor locations, and wiring diagram for all related equipment.
9. Main Cabinet enclosures shall be FRP free standing panel mounted on ½" PVC with hot dipped galvanized unistrut with plastic feet secured at floor and ceiling. Starters and related shall be individual and mounted individually in the panel with runs and connections to each starter and its related component in a NEMA-4X panel. NEMA-4X for all panels located with pool environment or outdoors. All electrical components within the enclosure shall be mounted on a removable back plate. Each Unit shall be complete with:
   a. Flange mounted disconnect with circuit breaker load protection. Rotary style disconnects will not be accepted.
   b. Single point power connection from main incoming voltage
   c. Fluorescent light interlocked with door and external switch(es)
   d. Programming shelf

e. 110 volt courtesy duplex GFI receptacle
f. Control and step down transformers
g. DDC controls
h. Power distribution blocks
i. Phase and voltage protection
j. Starters with integral circuit breaker overloads
k. 20% free area
l. All wiring rated at 600Volts
m. All wiring to terminated at terminal strip
n. VFD's
o. Ventilation as required
p. Externally mounted operator interface
q. Control relays
r. Alarm enunciation local and remote
s. Interface 4-20mA signal from flow meter/chemical controller

10. Components shall be the product of a Manufacturer regularly engaged in electrical controls. VFD's shall be as manufactured by ABB or Danfoss Graham VLT Drive shall be LON Works or BACnet compatible. Drives shall be suitable for cabinet mounting, IP20 rated enclosure, integral display, variable torque rated for centrifugal pump application. VFD's shall be supplied for all filter pumps with differential pressure control. Motor starters shall be integrated circuit breaker overload type, IEC rated. Buttons, switches and lights shall be of AB T-800 style or equal
11. Sub panels and safety devices shall be Pool Equipment Room panels NEMA 4X, fiberglass and hinged. Mechanical fasteners will not be accepted. All satellite panels shall be 30 VAC/DC or less. All wiring terminated to terminal strip and 600 volt type MTW or equal.
12. E-Stops shall provided where shown on plans and shall be NEMA 4X, mushroom type, push to stop, keyed reset. Estops at the pools shall have a lexan hinged cover. Estops shall also have a switched audible alarm built into the panel.
13. Pump safety disconnects shall be provided and shall be NEMA 4X with auxillary contacts. All disconnects shall be mounted with in line of site of pumps and clearly labeled with lamacoid tag with the pump ID.
14. Operator Interface Panel shall contain LCD display capable of monitoring/controlling all system control points. Panel shall include manual push button start/stop control for pumps and E-Stop for pool. E stops shall be 12 volts or 24 volts so they may installed within 5' to the waters edge and comply with Article 680 of the NEC. Enclosure shall flush mount, NEMA-4X/12. Alarmed E-Stop with lexan cover shall be furnished and installed as NEMA 4X, mushroom type, push to stop, keyed reset with fiberglass enclosure with hinged cover. Lamacoid sign shall be placed over the Estop indicating emergency stop alarm will sound.
15. Controls shall be mounted in a NEMA 4X watertight fiberglass control box and have a green running light with red off light to signal the operator the equipment is on or off.
16. Panel shall also house pump controls for the dewatering manhole. These pumps shall be float or sensor monitored with each pump having its own circuit. Each pump is sized for 100% of the design flow rate with the second pump being considered backup. Pumps shall on off auto with time clock to cycle every 30 days.
17. Panel supplier shall provide up to (4) four hours installation supervision as required by the electrical contractor.
18. Panel supplier shall be responsible for start-up, commissioning and (4) four hours formal class room owner training as required for operation and maintenance of system. Pool Contractor shall calibrate via the pump(s) curve, flow requirements to automatically control the VFD's against the flow meter with the chemical controller.
19. Information as stated herein is based on Automation Logix 386 313 2791 klantaigne@automationlogix.com.

2.30 STRAINER:

A. Each filter pump shall be protected with a non-corrosive strainer on the suction side of the pump, either a strainer for each or one strainer for both. Fluidtrol, Mermaid or acceptable fiberglass strainers shall be used.

B. There shall be a Strainer for the filter pumps and suction piping Model No. SW Series with SS316 strainer baskets as manufactured by Fluidtrol. Filtration pump strainers constructed of non-corrosive materials. Body shall be Schedule 80 PVC rated at 75 P.S.I. Strainer to have minimum open area of 4.7 to 1. Inlet and outlet to be flanged connections drilled to 150# ANSI vanstone style.

C. Lid to be manufactured of clear acrylic to allow unobstructed visual inspection of basket and a viton o-ring. Strainer shall be complete with perforated stainless steel basket of 16 gauge 316 stainless steel with 1/8" holes on 3/16" staggered centers with a staggered design. Strainers shall have a 316 stainless steel screw down clamp.

1. Furnish and install all valves to match line size.
2. Furnish and install fiberglass concentric to match pump and line size
3. Furnish and install eccentric to match pump and return line.
4. Supply one spare basket for each strainer.

2.31 PIPING, PENETRATIONS, VALVES, HANGARS AND FITTINGS:

A. All pool recirculating piping and fittings shall be delivered to the site and placed in an area as directed by the General Contractor/Construction Manager. All pipe and fittings shall conform to the information as stated herein. All piping shall be installed in accordance with the information as stated herein and manufacturers guidelines for basic materials and methods for installing piping systems. All fittings shall be Molded. All piping shall be rigid PVC Schedule 80 NSF Approved for potable water.

1. All unistrut, hangars, threaded rod, nots bolts, washers and or components shall be hot dipped galvanized
2. All Unistrut, hangars, threaded rod, nuts, bolts, washers, lockwashers and or components installed in wetted areas shall be 316L stainless steel.

B. All balance tank penetrations and or pool wall or floor penetrations shall be with no leak flanges sized 6" (3" each side) larger than the O.D. of the pipe. All penetrations requiring sleeves shall be PVC sleeves with Link seal installed around all piping. Balance tank connections shall be flanged with stainless steel nuts bolts and lock washers.

1. The balance tank shall have a level indicator visible in the filter room consisting of clear 1½" Schedule 40 with 1 ½" solid PVC Schedule 40NSF piping cored and sealed with Link Seal thru the wall of the balance tank. The Level indicator shall also have (2) 1½" PVC ball valves to isolate the view tube.

C. All building wall penetrations and filter room penetrations shall be cored. Piping and fittings shall be the product of one manufacturer George Fisher, Eslon, Asahi, Spears, Plastinetics, Harvard, Chemtrol or the like provided they comply with the information as stated herein.

1. All piping shall meet ASTM-D1785 to indicate Manufacturers Name or trademark, material designation code, nominal pipe size, schedule size with the pressure rating in

psi for water at 73 degrees, the ASTM designation number D-1785 and NSF seal for potable water.

2. All fittings shall meet ASTM-1785, ASTM D2467 and be molded.
3. No stresses shall be placed on any fitting or pipe during installation nor be placed in such a fashion to support the pipe from or off of a fitting or section of the pipe. The pipe shall be installed in accordance with the information as contained herein and all manufacturers technical installation.
4. All trenches to following the run of the pipe and supporting the entire length of the pipe and fitting in their entirety, prior to and consequently during the backfill process. Maintain pressure and testing as described in this section. All pipe and or fittings shall be bedded in compacted to minimum of 95% compacted sand fill in accordance with the information as stated in another section herein. No pea gravel or split shot shall be used for backfill unless stated otherwise for specific conditions.
5. All fitting shall be installed in accordance with manufacturers technical installation and bulletins. A manufacturer approved primer must be used. Primer must not be the same color as the pipe or fitting unless it is recognized by the manufacturer and if used each fitting must be painted red after pipe and fitting are glued together. Solvent weld all PVC pipe and fittings as indicated unless otherwise noted.

D. The pool contractor shall remain responsible for all pool-piping installed for the operation of the pool for the duration of the project. All plumbing outside and under pool floor pool shell shall be bedded in sand with all trenches also backfilled with sand, smooth and free of rocks and debris.

E. Piping trench bottom shall be compacted smooth and angle with the bottom of the pipe to support all piping and fittings. Fittings shall not support the pipe.

F. Do not support underground piping over any type of chair or bolster.

G. Backfill in accordance with Division 31 and ASTM D2774, in layers of 6" or less.

H. No pea gravel or split shot shall be used for backfill material.

I. All changes in direction shall be with 45 degree fittings. No tees shall be installed on primary runs to branch lines. Drawings are for clarity and simple interpretation other conditions such as fittings and other related trade piping along with other pool related lines must be taken into consideration when laying out pool piping. Flush all piping with potable water and seal all ends after flushing with caps or duct tape. Thrust blocks shall be installed at the end of all primary runs to secure the pipe and fitting from potential thrust or movement.

J. After rough piping and prior to the installation of any concrete and through the installation of the deck pressurize all piping with 10# min. until the installation of the deck (this includes all gutter piping). Note initial testing shall be hydrostatic with 50# for 4 hours minimum. Pneumatic testing shall not be allowed.

K. Concentric reducers shall be fiberglass, PVC or stainless steel. Cast iron may be used provided it has a Scotchcoat lining.

L. All piping shall be marked with directional arrows indicating normal direction of flow. Minimum 1” tall by 3” long arrows shall be placed at intermediate positions and at any (both) changes in direction. Arrows shall be painted or color taped shall be used. Arrow head shall be larger than the width of the body. Colors are as follows. Heating pink, Fresh water dark blue, backwash black, main drain (if exposed) medium blue, Filtered water Return lines light

blue, Gutter dark green, Chlorine conduit yellow, acid red, auto fill medium blue, water feature lines shall be labeled as to the feature and have orange arrows.

M. 3" overflow piping shall be set 1" above the rim of the gutter and gravity drain to backwash/ overflow sump with @1" pitch to the sump. Gutter to waste.

2.32 PIPING SUPPORT SYSTEMS:

A. Overview
1. Furnish and install anti vortex plate or 4 times the suction pipe diameter with a PVC flanged connection in the balance tanks above the balance tank floor for connection to pump suction line within the balance tank. Gutter line flange shall be secured to balance tank floor with 3/8" hole in gutter line before it turns to floor of tank.
2. Prior to the installation of the final deck the pool contractor shall verify in writing to the construction manager that all pool piping is sound, workable and free from leaks. Paint directional arrows on all filter room piping indicating normal direction of flow as indicated in another section.
3. Install piping and hangars in accordance with the information as stated herein, manufacturers guidelines and Section 22 04 50 Hangars. Supports and inserts Section 22 05 00 and Pool Section 13 15 00. The more versatile and corrosion resistant as well as compatibility of the information shall prevail.

B. Piping hangars, Unistrut and Support: Piping supports shall be Hot Dipped Galvanized in dry areas and stainless steel in wet areas. Any place galvanized is mentioned it shall be interpreted as Hot Dipped galvanized. Supports shall be arranged and as installed to best utilize pump head and reduce friction loss. Changes in direction shall be with 45 degree fitting especially for all effluent line involving start stop of the system. In the shop drawings when laying out piping systems account for layout to best suit gravity and pressure systems. All gravity systems shall allow for a minimum of 1% pitch to the balance tanks and or pump systems. Bedding or deep lines shall not allow for differential settlement of the fitting. No fitting shall support the weight of the pipe or soil. All piping shall be sufficiently bedded so movement does not occur causing the fitting to fail. All molded fittings shall be used to provide additional strength to the fitting.

1. Pipe clamps must be installed to properly disburse the load over the beam or truss. Verify if truss or beam is top or bottom cord bearing before making connection.
2. C Clamps shall include set screws and locknuts such as B line B351 or B3036L. Top flange type shall be equal to B line Model No. B3034 or B3033. Retaining straps shall be used to keep the clamp in position. Models B3050 and 3055 shall be used for center position. Cross bolt style B3291 thru 97 as required.
3. All hangars, rod, saddles, anchors, clamps, bolts or hardware in the balance tank shall be stainless steel.
4. All threaded rod, rod supports, bolts, anchors, nuts and washers for valve assemblies and piping to be stainless steel. All hangar rods must include locking nuts, lock washers or double locking nuts.
5. Wall mounted or ceiling mounted unistrut hangars shall be hot dipped galvanized with painted ends. Wall supports shall be welded strut type B Line model B3064 and B2000 series with brackets Model No. 3066 or 67 with adjustable steel pipe roll Model no B3120 or 3110. For smaller pipe Jhook hangars Model no. B3600 may be used.
6. Cast in place concrete inserts painted steel B line B2500 or 3014N. Inserts shall allow for lateral adjustment and must match rod size. Where continuous inserts ar located the galvanized steel insert must be painted with epoxy prior to installing and must be minimum of 12 gauge ASTM A1011 Grade 33 with Styrofoam and have a load rating and be installed to support the piping and or loads hung off of the hangar with a

minimum of 2,000 pounds per foot. B221, 321 or 521. Proper Channel nuts for this application shall be used.

7. Floor mounted piping or equipment fiberglass designed and approved by the manufacturer for the weight, vibration, spacing and thrust for this type of installation. All floor supports shall be have fiberglass or PVC floor flanges or separation thereof to the concrete floor or pads.
8. All anchors and or bolts and washers shall be galvanized steel except in balance tank or wetted areas which shall be stainless steel nuts bolts lock washer and related hardware.
9. All turns in piping shall have horizontal thrust blocks braced to the wall or floor to prevent piping from movement.
10. Preferred method for hanging piping is on wall of mechanical room. In mechanical room any ceiling mounted piping shall disperse the load over structural members.
11. All piping shall be installed so pipe does not move when the pump is turned off or on. All piping shall be plumb and level in pool filter room.
12. All hangars shall be placed at valve locations.
13. Multiple hangars, gang hangars or unistrut pipe racks must be minimum of double back 12 gauge hot dipped galvanized ASTM A1011 Grade 33, 2 5/8" or greater with verification of the manufacturer and must comply with the information as stated herein and is in accordance with the manufacturer and the piping will be properly supported by the ceiling, truss, floor, deck ect. Roof deck, truss or beam supports will not be changed modified or increased to carry the load of any of the piping systems.
14. Make allowances in all piping for expansion and contraction.
15. Minimum Guideline for Maximum spacing for pipe hangars is as follows (additional supports and or spacing may be required based on manufacturers or structural engineers determination related to conditions of building members):

SCH 80 PVC Piping	Max. Spacing	Round Rod support (min.)
3/4" - 2"	5'-0"	3/8"
2 1/2" - 4"	6'-0"	1/2"
6"	6'-0"	3/4"
8" - 10"	6'-0"	7/8"
12"- 16"	8'-0"	1"

C. Valves:

1. The pool contractor shall supply the following George Fisher, Astral or Nil-Cor Valves: main drain, perimeter overflow, balance tank to waste, overflow to waste, main drain to waste, filter, filter pump(s) to waste, drain pump to waste backwash drain, pump suction(s) and discharge(s) and filter water supplies and all other required valves to achieve a complete installation and fully functional system.
2. Valves shall be of the filter water type butterfly PVC with polypropylene disc, stainless steel shaft, EPDM seals and stainless steel stops. All valves in the balance tank shall be operable from the floor of the filter room via stainless steel sleeves with stainless steel caps, stainless steel extensions, stainless steel guide sleeves thru balance tank via gear operators for each valve.
3. Valves shall be lockable in position. Valve are to have gear operators for all valves 3" and larger in the filter room.
4. All connecting hardware in balance tank shall be to flanges shall be with stainless steel bolts, nuts and washers.
5. All valves and or connecting hardware in the filter room non-submersed and above the filter room floor shall be galvanized steel.
6. Float valves in the balance tank shall be constructed of stainless steel and designed for submerged service. The valve body shall be fabricated of Schedule 10 T304L stainless

steel with 1/4" thick standard flange pattern. The internal disc shall be 12 gauge T304L material and positioned with 1/8" opening around the perimeter of the disc. The valve body shall incorporate exterior stops constructed of T304L stainless steel to define the allowable range of float arm motion. The valve shall have valve stops to secure the positioning of the valve disc. The dual ball floats shall be constructed of T304L stainless steel and be 7" in diameter with internal weighting. The floats shall also be adjustable using sliding collars.

7. Valves must have the Cv rating as indicated for the George Fisher, Astral or Nil-Cor valve. All stainless steel bodied valves may be used.
8. Furnish and Install New main drain and Gutter actuators with Series 30 Bray valves with undercut discs. Fisher 1051 and 1052 with positioner or Mermade Level Control Valve Assembly. Actuator valves on gutter line and main drain line to fail closed. The gutter and main drain valve shall be normally closed to prevent flooding during periods of a power failure. Furnish and install a new stainless steel pilot valves mounted in the balance tank with accessories. Furnish and install 1/2" CPVC pilot line with 1/2" in-line strainer, 1/2" brass needle valve, and 0-60 2 1/2" pressure gauge. Valves to be controlled from pump pressure. All control piping shall be CPVC and horizontal runs shall be continuously supported in FRP unistrut.

D. All pool recirculating piping in the pool equipment room 3" and larger shall be water tight gear operated George Fisher or Nil-Cor valves with PVC disc, EPDM. Valves smaller than 3" shall be PVC true union, full port and three piece construction. No valves shall be bolted directly to any pump where the valve or valve disc may interfere with the performance of the valve. Other types of valves may be submitted as an alternate for consideration provided they are submitted and comply with the information as stated herein.

1. All check valves shall be non-slam type check valves, ANSI 300 flanged furnished and installed for all pumps and be located above the eccentric fitting of the pump and shall be Technocheck or Centerline Stainless steel Series non-slam, double door and match return line size. Valve shall be elastomer hinge style 5000 Series with epoxy coated cast iron body with 316L stainless internals, 316 stainless steel spring with EPDM member materials or Centerline Series 800 with stainless steel, elastomeric lined 316L stainless fitting. Crane, DeZurik with stainless steel doors and hinge pins all with stainless steel bolts, connections and fittings
2. Any valves to be controlled above 5' in height shall be accessible from the floor of the filter area and clear below and shall be gear operated chain operated with #16 brass or stainless steel chain.

E. All piping and or valves in balance tank shall be supported and held in place with stainless steel hardware with threaded rod and or supports.

1. In all wetted areas all PVC or Stainless Steel flanges shall be installed with stainless steel nuts and stainless steel bolts, stainless steel washers or threaded stainless steel rod. All nuts shall have stainless steel lock washers or lock-tite. Bolt ends shall be filed or ground to eliminate any burrs.
2. In filter room PVC or Stainless Steel flanges shall be installed with galvanized steel nuts and galvanized steel bolts, galvanized steel washers or threaded galvanized steel rod. All nuts shall have stainless steel lock washers or lock-tite. Bolt ends shall be filed or ground to eliminate any burrs.
3. Valves in balance tank shall have valve stops, sleeves, covers, extensions and gear operators for operation of valves above the floor of the balance tank.

F. Influent and effluent piping for pool boilers shall be NSF approved, CPVC with CPVC to Schedule 80 PVC Flanges with gaskets, stainless steel bolts, nuts and lock washers.

G. All wafer, float or check valves shall be furnished and installed with PVC Flanges, stainless steel bolts, stainless steel nuts and stainless steel washers and lock washers except in the pool equipment room which can be hot dipped galvanized steel nuts, bolts and washers. Liquid "Cold galv" shall be used to touch up any areas where galvanizing may have been stripped away.

2.33 FLOW METERS:

A. All Pools shall have a means of measuring flow by use of a flow meter and gauges located on each of the pumps.

B. The filter flow meters measuring filter and flow rates shall be an assembly consisting of a Signet 2551Magmeter with 8550 flow instrument, transformer, universal adaptor, 4 to 20mA input polypropylene and 316L St.St. sensor body and electrodes, programmable, EPDM rings and relays. Flow sensor wired into the pool controller. The sensor shall be installed with saddle fitting or clamp on fitting for larger pipe and wired into the controller and flow instrument with 24 volt power with 4 to 20mA signal by the pool contractor. The flow sensor shall be fabricated of stainless steel. Internal circuitry eliminates the need for magnets. Unique rotor has bearing design increased reliability. The flow sensor shall be accurate to +/- 1% of full scale reading with repeatability of +/- .5% of full scale. The flow sensor shall be set for mid range on the gauge scale. The flow meter shall be calibrated from the pump curve and gauge readings. Install flow meter sensors in a straight pipe with no changes in direction for 10 pipe diameters downstream from the bypass in the return line and 5 pipe diameters downstream to the nearest obstruction or fitting. Flow meters sensor shall be 5-24 VDC 1.5ma and monitor is 12-24 VDC 10 watts max. One flow control valve shall be placed 5 pipe diameters upstream from each of the flow meter sensors and 10 pipe diameters downstream from each flow meter sensors.

2.34 AUTOMATIC WATER LEVEL CONTROLLERS:

A. Pool shall have an automatic and manual fill with overflows from the balance tanks. Pools shall have a device allowing for 4” manual and automatic makeup water in the balance tank. Watts No. 900 RPZ 4" fill shall be provided from the filter room.

B. There shall be an automatic water level furnished and installed for the Pools. Auto fill for the pools shall be Cla-val Model No. 124-01 bronze body, bronze disc retainer and diaphram washer, stainless steel trim, disc guide, seat and cover, buna N disc, nylon reinforced buna N rubber diaphram, stainless stem, nut and spring, stainless steel float valve as indicated on the drawings. Float operated fill valve shall be complete with stilling chamber, X46 flow clean strainer, CK2 cock (isolation valve), closing speed control, independent operating pressure, speed control (opening) X 43 "Y" strainer. Float valve is non modulating controlling the level in the tank. Valve is designed to open fully when liquid level is reaches the low point and preset high point. The valve is hydraulically operated diaphragm valve with the pilot control and float mechanism mounted on the cover of the main valve. The stainless steel float mechanism shall be located in a 10" diameter PVC stilling well. Stainless Steel Float shall be mounted to a stainless steel rod.

C. Furnish and install electrode sensing water level controller for the Therapy Pool. Link, Gem, Blue/White, Neptune Benson or Water Witch automatic water level controllers provided they comply with the information as stated herein. Furnish and install Level Link 6200 Liquid-level indicator and control unit. NEMA 12 Enclosure with clear cover houses level indicator panel. Optimum water level indicator hi-level, low-level and adding liquid indicators. External alarm

interface. 24-hour clock for selection of acceptable fill times. Clear PVC level sensing chamber separate from level control unit. ¾" brass NC solenoid valve provided.

1. It shall be the electrode probe type.
2. The electrodes shall be installed in the view tube
3. The electrodes shall be placed through the top of the holder, which is to be located above the rim of the balance tank
4. The sensor shall have a repeatability of .05" WC.
5. The switch shall be connected to the pool by a water sensing line complete with shut-off valve and air release drain cock.
6. Sensor and a 3/4" UL approved normally closed 24 volt slow closing solenoid valve with manual override, sensing delay to prevent valve chatter and 7 day 24 hour programmable time clock and flow adjustment control shall be supplied.
7. Auto fill to be set to fill pool via an air gap above the balance tank. Mount control and electrical sensor on balance tank wall @5' above the floor and not on the open side of the balance tank wall.
8. Secondary contacts shall control the high level in the tank with an additional set of sensors and control set to turn off the fresh water fill solenoid valve.
9. All sensor wire in pvc conduit, junction boxes and power in pvc conduit by Pool Contractor.

2.35 BALANCE TANK ALUMINUM DOOR AND LADDER RUNGS:

A. Access hatch into balance tank shall be furnished as indicated on the drawings. Pool Contractor shall verify exact location so that the hatch does not interfere with piping, equipment and valve extensions. The hatch shall be a single door 3'-0" X 3'-0" for the balance tank. The channel and pan shall be 1/4" clear anodized aluminum. Hinge shall be constructed with 316 stainless steel tubular type operator's spring operated with a lock to hold open. All hardware shall be 316 stainless steel with a lockable latch. Apply chemical resistant finish to the interior of all components. Door shall be as manufactured by Nystrom or Bilco with solid lockable aluminum cover. Any exposed concrete areas including to the entire top of the concrete decking at the balance tank door shall be coated as described in the waterproofing section herein.

B. Furnish and install ladder rungs (8) for each balance tank. Ladder rungs to be self-securing type set with epoxy. 1/2" Grade 60 steel with manufacturer applied co-polymer polypropylene coating.

C. Manhole and door information is specified in another Section of the documents.

D. 6" rigid PVC Schedule 80 underdrain line from the inspection sump to pool by the Pool Contractor.

2.36 FRESH WATER FILL AND BALANCE TANK VENT:

A. Pool shall have a means of manual fill provided in the filter room and run to the Balance Tank and Auto fill.

1. Manual fill 4" valved in the filter room and piped into the fill area by Division 13 Contractor and protected by the Pool Contractor with a Watts No. 900 reduced pressure zone backflow preventer located in the pool equipment area for the filter actuation. Pool Contractor to run 4" manual and 1" auto fill at balance tank access door. Furnish and install all piping connections in the pool equipment room including connections to the filter control valve.

2. Furnish and install a 4” PVC vent thru the balance tanks for connection to ventilation fan and a 3” vent and U set @12” above the top of the tank for ventilation air.
3. Furnish and install clear 1 ½” PVC sight glass with ball valves on each surge tank to verify the water level in each tank.

2.37 MAIN DRAIN OUTLETS AND HYDROSTATIC RELIEF VALVES:

A. All Pool drains shall be encased in concrete and reinforcing steel to drain 100% of the water from the pool via pool pump and gravity flow to drain into a separate floor sump provided by with a minimum of a 6" air gap.

B. All drains shall be VGBA compliant under APSP 16/ASME A 112.19.8. Daldorado Sumps with 25 year service life 18” X 36” sump and suction outlet cover, Floor 1,984 flow with 401 square inches of open area with 61% Open Area. VGBA compliant and NSF Approved under main drain outlets. All covers shall be secured in at least 4 places with stainless steel screws. Box shall have no leak flanges around the box and around all pipe connections.

1. Drains shall have a Maximum velocity shall be 1' per second. In the bottom of each box shall be a 2" hydrostatic relief valve. The body of the hydrostatic relief valve shall be high impact schedule 80 PVC pipe, perforated with 3/16" release hydrostatic pressures under the pool. The commercial valve shall be 12" beneath the check valve. At the end of the perforated section, the hydrostatic relief valve body shall be capped to prevent clogging and at the top there shall be provided a check valve allowing water to enter from under the pool only. The check valve shall be of heavy PVC construction with a machined interior to insure water tightness.
2. Pipe connection shall have a minimum of 1 1/2 pipe diameters from the back of the grate to the pipe connection on the box.
3. Flow for Competition Pool filter system is 2,556 GPM. Each drain shall flow @639 GPM. Maximum velocity based on 639 GPM each with an open area of 401 sq.in. or .08’/sec.
4. Flow for the Diving Pool is 400 GPM. Maximum velocity based on 400 GPM with an open area of 401 X 2 = .16’/sec.
5. Flow for the Therapy Pool and the Warm water pool is 400 GPM. For the Therapy pool flow including 240 GPM for the jets is 640 GPM. Maximum velocity based on 400 GPM + 240 GPM = 640 GPM with an open area of 401 X 2 = .256’/sec. and the Warm Water Pool with a flow of 400 GPM plus jets @200 GPM = 400 + 200 = 600 GPM with an open area of 401 X 2 = 802 = .24’/sec.

C. Drains shall comply with ANSI/APSP 16-2011, which replaces ASME/ANSI A112.19.8-2007 and addn. 8a-2008. Virginia Graeme Baker Pool and Spa Safety Act, Consumer Products Safety Commission and Association of Pool and Spa Professionals.

D. Sumps in the filter room shall be covered with 1 ½” X 1 1/2” X 1 ½” FRP grating with 1 ½” bearing, set flush with filter room floor.

2.38 AUTOMATIC SWIMMING POOL WATER TREATMENT AND CONTROL SYSTEM:

A. All pools shall receive an integrated water treatment control system shall provide continuous monitoring and control of sanitizers, oxidizers, pH, temperature, UV and system flow rate. Installation of the system shall be per the manufacture’s specification. A factory trained/authorized representative shall provide training to the owner. This Section includes pools chemistry control and monitoring consisting of a Chemistry Controller, Flowcell Assembly, Sensors and Communications. System is a programmable Pool Chemical Automation System furnished and installed for continuous monitoring and control of the recreational water chemistry and related disinfection equipment.

1. The water chemistry control system for each pool shall provide Continuous, real-time monitoring and control of pH, ORP; primary, secondary and supplemental disinfectants per the CDC Model Aquatic Health Code (MAHC), Free chlorine, total chlorine, combined chlorine, bromine, chlorine dioxide and ozone concentrations in PPM, UV dose, system flow rate, and water chemistry balance calculations and other readings and control as deemed necessary for the project per this section. The controller shall manage the recirculation pump on/off status. Minimum controller is DCM 502 with DCM51 controlling.
2. Controller shall control acid feed, CO2 feed and chlorine feed and have a manual switch over.

B. The manufacturer shall provide a separate NEMA 4X enclosure to allow field installation all line-voltage and control wiring for all related and controlled equipment by the specified controller. The separate NEMA 4X enclosure shall eliminate the need to access to the chemical controller's electronics. For safety, liability and overall system integrity the referenced wiring box must be provided by the chemical controller manufacture.

C. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the Owner and the training shall be video recorded as stated in the project contract documents.

1. The controller system shall be NSF® Standard 50 listed for automatic controller equipment for swimming pools, spas, hot tubs and other recreational water facilities.
2. The controller system shall be certified to UL61010/IEC61010 standards and manufactured in an ISO 9001:2000 facility.
3. The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer/oxidizer level within +/- 0.1 parts per million (PPM) or +/ - 10 mV (millivolts) of Oxidation Reduction Potential (ORP) the pH within +/- 0.1 pH unit of the set points selected by the operator
4. All set point and calibration levels shall be adjustable with a keypad mounted on the front panel of the unit as well as the remote interface
5. The controller shall use pH sensor with +/- 0.04 accuracy in the operational range of 6.8 – 8.2 as certified by NSF an ORP sensor with an accuracy of +/- 3% mV as certified by NSF, a free chlorine and total chlorine sensors that operate in a range of 0.1 parts per million (PPM) up to 10.0 parts per million (PPM) within a 9% accuracy as tested by NSF or other third party certifying agency, be capable of actuating all outputs in the following operator selectable modes: off, manual, automatic, proportional PID (Proportional+Integral+Derivative) control, must be able to interface pulse output chemical feed pumps for true PID control to ensure chemical conservation. Programmable events can be time set to occur daily, weekly, or monthly.
6. The controller shall be supplied with ORP, pH, temperature, TDS, and free chlorine and total chlorine sensors for indoor applications. All outdoor bodies of water shall provide OPR, pH, temperature with optional cyanuric acid and/or hydrogen resistant free chlorine sensors available for specific application use with stabilized water or saline pools.
7. The appropriate amperometric sensors to provide the capability of real-time monitoring and control of the PPM concentration of various primary, secondary and supplemental disinfectants per the MAHC such as but not limited to ozone and chlorine dioxide.
8. The controller must be capable of controlling UV system dosing based on a real-time combined chlorine as calculated by the readings from an amperometric free chlorine and total chlorine sensor. Therefore ensuring power savings and chemical savings when interfaced with the UV systems. Controller must measure and control via real time combined chlorine levels. The controller must utilize simultaneous ORP and PPM control for managing both the quantity and quality of the sanitizer/oxidizer.

9. Controllers must have the ability to control simultaneously to ORP and PPM control points or that utilize an alternate chlorine set point or boost function and shall include a temperature sensor and automatic control of the heater/boiler.
10. The controller shall be capable of remote monitoring the recirculation flow rate of the system via with compatible mag meters eliminating the need for other flow monitoring devices. Additional to the sample assembly flow switch (interlock) the controller shall possess the capability of using a square wave flow signal as a supplemental chemical feed interlock to prevent the dosing of chemicals during a system low flow/no flow condition.
11. The controller shall be capable of accepting up to seven (7) square wave signaled flow meters, real-time monitoring of heat exchanger/tube bundle corrosion and alarm out should corrosion rates exceed standard mil erosion rates.
12. Include conductivity sensor for the purpose of TDS control via the assignment of one of the controller relays to control a field supplied dump valve, continuously calculate and display the Langelier Saturation Index and Ryznar Index using either sensor data and/or manual input for pH, temperature, total alkalinity and calcium hardness. The resulting calculated water condition shall be displayed on the main screen as either "Scaling", "Corrosive" or "OK".
13. The controller shall control and monitor the make-up water for the body of water and have the programmable option of blocking the feed of chemicals during any addition of water make-up water. As a part of energy management and water conservation the controller via its remote software package shall data log and provide water usage per day, week, month and year. System shall control and or log the make-up water use.
14. The controller shall have no less than 7 fully configurable digital inputs, 10 configurable analog inputs, minimum of 5 (115v) fully assignable relays, minimum of 4 fully assignable digital outputs, be capable of expanded capabilities with an optional input/output expansion card kit.
15. The controller and sensing flow cell shall be pre-assembled, pre-wired, and pre-mounted on a heavy duty PVC back panel by the manufacturer at the factory's production facility. All high voltage field wiring shall be through a separate NEMA 4X factory engineered and supplied enclosure that precludes direct access to controller electronics. All high voltage connections shall be clearly identified and a field wiring diagram shall be provided with the controller for installer reference. All controller high-voltage relay assignment parameters shall be programmed at the factory prior to delivery to installation location.
16. The controller shall include a sensing flow cell that is hydraulically designed to allow verified correct flow and consistent pressure across all sensors. Flow cell will be clear PVC that is modular in concept and have the flexibility to add supplementary water chemistry sensors as desired. The sensing flow cell shall include a safety flow switch sensor, water spigot, and isolation valves. Flowcell shall have a PVC body with two ½ -14 FPT ports for potentiometric probes, two ¼-18 FPT ports for temperature probe and wash injection with a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC ½" isolation ball valves, PVC ¼" wet test valve and flow switch.
17. The flowcell safety flowswitch shall have the capability to be continuously monitored and data logged while being monitored and controlled via two-way remote communication and real time remote viewing of the sample line flow switch via the internet.

D. The controller shall have as a standard feature an HTML server that allows full two-way remote communication and fully control of all parameters. The controller shall be accessible with a standard internet browser using a fully interactive Ethernet TCP/IP graphical interface that includes security access codes. The controller shall be capable of providing real-time

monitor and control via a personal computer, smartphone, or tablet device. The controller shall include downloadable software that is capable of providing real-time auto polling, data logging, email and text alarms and provide both graphical and report formats. The controller shall include programmable high and low alarm levels for all control functions with operator-selectable feed lockout and alarm buzzer options. The controller shall be standard with e-mail and text out alerts on alarm activation. The controller shall also email out notification user defined if it any automatic control feature is deactivate or changed at tat the site by an operator. The controller shall have the ability to allow field upgrades and updates and programming as needed.

E. The control system shall be provided with on-site start-up, on-site operator training performed by a representative trained and authorized by the controller manufacturer. Manufacturer shall supply an operation and maintenance manual describing features, operating instructions, maintenance procedures and replacement parts.

F. Information herein is based on Pro Minent Fluid Controls - Pittsburgh, PA (412) 787-2484

G. The controller electronics shall be covered by a standard manufacturer warranty of five (5) years. ORP and pH sensors will be covered by a standard two (2) year warranty. Other sensors and parts shall be covered by a standard one (1) year warranty.

H. Controller shall be hooked up to a dedicated 110 volt 20 amp circuit with dedicated neutral from the pool control panel with connection. Controller shall interface with the circulating pumps to turn off the controller and chemical feed pumps when the pump is shut off or in the event of a power failure. This is over and above the built in flow switch.

2.39 CHEMICAL FEEDERS:

A. Accutab Chlorine and Accutab acid feed system shall be Installed and shall be controlled by Prominent chemical controllers direct wired into the controller by the pool contractor for:

1. Protective goggles, Respirator with replacement cartridge, Face Mask, PVC Gloves, 55” apron Recreonics Model No. 12-638 thru 677
2. Chlorine Sign, Acid Sign, Enzyme Sign on each of the containers. Recreonics Model No. 53-150 thru 155.
3. Furnish and install spill containers under under chemical feeders. Each of the chemical storage containers spill florinated pallets with a capacity of at least 66 gallons and grating with 1.75" square openings and a 3/4" drain plug. Containers shall be Interstate Products Model No. UT-1233 51” X 51” X 10 tall. Maximum storage capacity of 6,600#.
4. Each Filter room shall have CO2 with the fill piped to the outside. Prominent CO2 controller with Carbo-Mizer 750 High Capacity CO2 with regulator outside fill/vent lockable stainless enclosure. (2) 50# CO2 Storage container. All storage containers shall be chained to the wall in storage room on the first floor. Regulator shall be installed in filter room with the Pool contractor to wire CO2 feed regulator into the chemical controller.

B. Chemical Feed System shall be Accutab Calcium Hypochlorite Tablet Chlorination System. The system shall be designed to feed low concentrations of calcium hypochlorite in solution intermittently or continuously as required for Competition Pool and Therapy Pool. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of chlorinator, electrical box, centrifugal pump, and balance tank for ease of installation and operation. The system shall be the PowerBase Model 3070AT and Model 1030 by PPG Industries, Inc. Only Accu-Tab® Blue (or Blue SI) calcium hypochlorite tablets by PPG Industries, Inc shall be used, with the patented solution modifier and the patented blue

colorant added for safety (to help prevent accidental mixing with other chemicals). System is NSF Approved under Standard 50 listed erosion feeder and tablet combination, and shall be capable of meeting all requirements of the Health Department having jurisdiction over the installation.

1. A maximum chlorine solution level of 0.05% (500 ppm) shall be maintained to prevent calcification in system components. Systems producing chlorine concentrations higher than 0.05% shall not be acceptable.
2. Delivery shall be by erosion feed technology to control accurate and consistent concentration limits in the chlorine treatment solution. Soaking type, spray and/or vortex technology systems shall not be acceptable.
3. The chlorinator shall automatically and continuously feed a limited quantity of chlorine in solution as needed; when the system is not running, no more chlorine than that amount which can be fed in one minute or less shall be left in the tank to prevent dilution. Batch systems preparing excess quantities of solution for delivery over an extended period shall not be acceptable.
4. A centrifugal pump wired to the system electrical box shall feed freshly mixed chlorine treatment solution only as required for maximum efficiency. Batch systems requiring the use of a metering pump or pumps to feed pre-prepared standing solution shall not be acceptable.
5. All piping in the chlorinator unit shall be Schedule 40 PVC. Systems with flexible tubing shall not be acceptable.

C. Tablet Chlorinator. Accu-Tab® chlorinators by PPG Industries, Inc are designed exclusively for Accu-Tab® Blue (or Blue SI) calcium hypochlorite tablets by PPG Industries, Inc. Tablets are placed on a sieve plate inside the chlorinator; as water flows across the sieve plate, the tablets erode at a rate proportional to the flow rate.

1. Accutab Feeders shall be:

    a. (2) Competition Pool: Model 3070AT - 1-1/2" FNP 22 lbs. per hour. 140# capacity, 25"W X 45"L X 51"H. 120V.
    b. Training Pool: Model 1030 with 1" connections, 2.8# per hour, 30# capacity, 29"W X 25"L X 40"H. 120V
    c Warm Water pool Model 1030 with 1" connections, 2.8#/hr, , 30# capacity, 29WX25 L X 40"H. 120V
    d. Diving Pool: Model 1030 with 1" connections. 2.8# per hour, 30# capacity. 29"WX25"LX40" high

2. A rotameter (flow-through) flow meter, measuring the flow of the water-dissolving stream to the chlorinator.
3. Flow Control Valve. PVC gate valve mounted in line with the flow meter allows operator to adjust flow of water-dissolving stream.
4. PowerBase units made of high-density polyethylene, PowerBase AT units made of PVC. Capacities: Model 3070AT
5. Primary Solution Tank Level Control. Made from Schedule 80 PVC and 316L stainless steel, this 1" float valve meters the tablet by-pass flow. The by-pass stream balances the variation in the water-dissolving stream. The float valve opens or closes to maintain the pump rate as it is manually throttled.
6. Secondary High Level Solution Tank Control. Prevents the solution tank from overflowing. High level: when activated, a switch opens the circuit to the solenoid valve, causing the valve to close.
7. Solution Delivery Pump shall be an optional constant run pump. Delivers chlorinated solution to the return line. A single-stage centrifugal pump is provided for systems with

pressures up to 20 PSIG. (For systems requiring a discharge pressures greater than 20 PSIG, a custom selected pump shall be utilized.)

8. Solution Injection Pump Air Bleed. Used to prime the pump at start-up, or at any time, if necessary. Primary Backflow Prevention. A PVC-spring-assisted check valve prevents reverse flow of water into the system. Discharge Control Valve (manual). Used to balance system output water flow with system input water flow.
9. Nema 4X Electrical Enclosure. Aluminum Frame, Type 6061-T. Two electrical circuits are required for operation: (1) 110v 20 amp power, and (1) 110v control circuit from a pool controller.

2.40 TEST KIT:

A. Taylor Series K-1741C; Professional Series test kit complete. Chlorine shall be capable of measuring chlorine residual to 10 PPM. DPD Test kit shall test ranges of chlorine from 0 to 10 PPM, Free Available and Combined chlorine, PH 6.8 to 8.4, Total Alkalinity, and Hardness. One separate Taylor series test kit capable of measuring of chlorine residual to 50 PPM.

2.41 PORTABLE VACUUM PUMP AND AUTOMATIC CLEANER:

A. Furnish and install Spectra Vac I electric vacuum system Model No. 10700 Harmsco BKP 1HP 13.8 amps, 5300 GPH, 105 sq.ft. filter and 1.5" connections. Electric pump with a 50' heavy duty cord and GFCI shock protector and twist lock type connection in accordance with current NEC requirements. Cart to be of stainless steel with 13" pneumatic tires. Unit shall have shut off valves for both influent and effluent lines with quick disconnect hose connectors. Vacuum cleaner shall have an over all width of 18". The 1-1/2" hose connection. Hose shall swivel 360 degrees and is tapered to accommodate the hose without the use of hose clamps. The white rubber wheels and nylon brush shall be adjustable. A hard plastic flap shall be provided at the front and rear edge of the head to dislodge foreign caked material. The cleaner shall accommodate flows ranging from 50 to 75 GPM. The swivel handle shall permit the cleaner head to remain parallel to floor at all times. Vacuum set shall include head, 20' and 50' of 1-1/2" floating hose with skimmer adaptor, one 8' to 15' handle and hose sleeve and nut.

B. (2) Automatic pool cleaners shall be 3002 Dolphin Commercial Automatic Cleaner Complete with caddy and remote extra bag and replacement scrubbing brush. Add FRP grating to block cleaner at end of ramp.

C. Furnish and install 10 fiberglass hooks at the owners direction for storage of vacuum hose and equipment.

2.42 HANDRAILS, GRAB RAILS, CUSTOM HANDRAIL:

A. Furnish and install custom SR Smith stainless steel Hand rails on both sides of steps and ramp. Rails shall be Powder Coated stainless steel fabricated from 1.50” OD X .120” wall, type 316 stainless steel. All in pool hand rails shall be double rail with handicap returns on the deck side of each rail. Use bronze or stainless anchors on the deck side of the rail to secure handrail and cover with escuteons. Intermediate rail shall be half way between the top rail and the step treads. Rail shall be by SR Smith

B. Furnish and install grab rails California Pacific Pretzel Bend Handrail. Rails shall be fabricated from 1.50” OD X .145” wall, type 316 stainless steel with powder coated finish . Exposed surfaces shall be Powder Coated. Deck anchors No. AS-2008 with escuteons Model EP-150 1.5" compression. All tile recessed in-wall steps shall be incorporated into the pool as indicated on the drawings.

C. Furnish and install Custom Handrail down ramp into Therapy Pool. Rails shall have handicap returns on ramp and step rails. Rails shall be fabricated from 1.50" OD X .145" wall, type 316 stainless steel. Exposed surfaces shall be Powder Coated with anchors and escuteons. Top of Warm Pool wall shall have a 16" long X 1.5" diameter X .145" powder coated grab bar to comply with ADA transfer requirements.

2.43 LIFE LINE AND RACING ACCESSORIES:

A. Furnish and install all anchors embedded into the pool shell for connection to the life line and racing lane lines. All metallic bodies shall be cast bronze with heavy chrome plate on all surfaces. All anchors shall be pinned into the pool shell with minimum #4 dowel rods. Lifeline floats shall be 5" diameter x 9" long. Cup anchors are eyebolt design suitable for 3/4" terminals. Twelve (12) lifeline floats shall be provided for each life line. Lifeline shall be blue and white polyethylene rope. Lifeline rope hook terminals shall be connected to the lifeline by a fusion of the polyethylene rope in the conical shaped anchor terminal. Paragon #14-501 or Recreonics #14-501 Cup, 14-456 Hook, 14-438.BW Rope, 14-404 Float

2.44 DRAIN SUMPS:

A. Grating shall be Gator Deck Pultruded grating FRP grating to be Isophthalic-Polyester or Vinylester) pultruded and shall meet ASTM E-84 Class 1 Flame Spread of less than 25 and ASTM D-635 self-extinguishing. Grating shall be GatorDeck I4010 1" deep .6" top flange and 1" bar spacing. Color shall be Gray and supported every 4' with the fiberglass strut system. Grating and Stair Treads shall be made from pultruded bearing bars and cross rods. Grating shall be assembled using a locking cross-rod design that makes a permanent connection between the cross-rod and bearing bar, and shall completely bonded into a one-piece panel. Shelves shall have a square tube nosing, Grating clips with 316 stainless steel. Minimum of 4 clips per piece. Manufacturers Seasafe Inc., Lafayette LA, (800) 326-8842 or approved equal

B. All FRP Grating set in concrete openings shall have a FRP embed angle frame. The minimum physical properties shall be:

Property	ASTM	Longitudinal Direction	Transverse Direction
Tensile Stress	D-638	30,000 psi	7,000 psi
Tensile Modulus	D-638	2.5 x 106 psi	0.8 x 106 psi
Compressive Stress	D-695	30,000 psi	15,000 psi
Compressive Modulus	D-695	2.5 x 106 psi	1.0 x 106 psi
Flexural Stress	D-790	30,000 psi	10,000 psi
Flexural Modulus	D-790	1.8 x 106 psi	0.8 x 106 psi
Modulus of Elasticity, E	Full Section	2.8 x 106 psi	

C. All structural shapes shall be fabricated per the drawings with good workmanship, closely fitted joints, and finished true to line and in accurate position to permit installation and proper joining of parts in the field. Use 316 stainless steel bolts and washers. All joint surfaces to be bonded shall be abraded to remove surface gloss and be free of burrs or other foreign

materials that would prevent proper adhesion. Use high-strength epoxy adhesives designed for FRP use and mechanical fasteners.

2.45 BACKWASH/OVERFLOW/DECK DRAIN SUMP:

A. Furnish and install custom concrete sumps with an 8” flanged connection. Grate shall be bolted down with hardened 5/8” stainless steel bolts, nuts and lock washers to a stainless steel flange. Concrete backwash sump with concrete bottom and waterstops shall be waterproofed as stated in another section. Modular in design and shall provide a 1 ½” deep recess top to accept a custom FRP grating.

B. Backwash/rinse sump and deck drain sump shall be covered with 1 ½” X 1 1/2” X 1 ½” FRP grating with 1 ½” bearing, set flush with filter room floor.

C. Storm sewer sump, Backwash/rinse sump, overflow/deck drain sump shall be covered with FRP grating as manufactured by Fibergrate. Fibergrate type IFR polyester resin reinforced with fiberglass roving. Use 1" X 4" X 1" rectangular mesh to accept 300 pound load. 1" min. bearing on at least 2 sides of the grate. Resins shall be fire retardant vinyl ester meeting the requirements of Class 1 rating of 25 or less per ASTM E-84 and meets the self-extinguishing requirements of ASTM D-635. Color shall be yellow. Resin shall be UV inhibited and the composite shall include a veil on all exposed surfaces. The top of the panels shall be covered with a bonded grit, baked epoxy, anti skid surface. Cut holes in grate as needed.

2.46 STARTING PLATFORMS AND ANCHORS:

A. (42) Fourty Two – SR Smith Velocity Long Reach Dual Post Platform with Track Start Long Reach Model No. VELOUR-DP-TS-SA for new Pool and (30) Thirty - Standard Dual Post with Track Start and Wedge, Velocity dual post Model VELO-DP-TS-TA for the existing pool with new Rock Solid anchors cored into the existing concrete and custom for the existing bulkhead using the same anchors. Starting Platforms are for the existing pool and the new pool. Starting platforms with dual anchor side step, grab rails, foot chocks, powder coated stainless steel with anchors. Track Start Model shall be full height with 24" X 32" top sloped 10 degrees. Furnish and install 6" deep anchors for starting platforms at the 50 meter and 25 yard/25 meter courses. Platforms shall have new kick sand style tops. Height must allow for RJP tops and kick plate.

B. Platforms shall have wiring harness by Colorado Time Systems, marine deck connection and wiring from deck to bottom of platform. Deck boxes shall be protected by the platforms.

C. Division 26 contractor to bond all anchors.

2.47 WAVE QUELLING RACING LANE MARKER LINES:

A. Each Lane marker lines shall be Competitor 6" Model for 50 Meter course and (2) 25 yard, (2) 25 Meter courses shall consist of individual float segments measuring 6” in diameter by 1-15/16" wide, butted end to end on 5/32" clear vinyl plastic covered aircraft type stainless steel cable to form a continuous line. Each float shall be Competitor type, injection molded of ultra violet stabilized polyethylene with four (4) turbo-reactive vanes integrally molded on each side of central diaphragm at right angle to the center cable sleeve and with a peripheral ring wide joining the central diaphragm to the turbo-reactive vanes. The vanes should be curved into peripheral ring to catch and absorb the energy in the wave as it strikes the vane. Each float segment itself shall be buoyant and shall rotate freely about the cable. Lines shall be assembled at the pool to insure proper fit. Aircraft type coated stainless steel cable, one

stainless steel extension draw bar spring, one stainless steel tension toggle, two stainless steel cable clamps, two cable thimbles, two stainless steel "S" hooks.

1. Racing lane marker lines shall be 15' at each end in a solid color for the 25 yard course
2. Solid extensions of 5 meters for the 50 meter course.
3. The break for the extensions shall be at the 5 meter marks or the end of the lane markers.
4. Three (3) discs of a separate color for each direction shall be installed designating the 15 Meter length for each course 25 yard and 50 meter courses and in each direction.
5. Install anchors pinned into the reinforcing steel as described in another section.
6. Furnish and install Competitor part No. 200384 converts 50 Meter lane lines to (2) 25 yard lane lines.
7. (5) stainless steel storage reels with wheels and covers.

B. Furnish and install all anchors embedded into the pool shell for connection to the racing lane lines and life lines. All metallic bodies shall be cast bronze with heavy chrome plate on all surfaces. Spectrum SS Cup, coordinate bond with electrical contractor as required.

C. Each connection shall be custom made stainless steel rods with hooks shall be rubber coated and set in white PVC sleeves where the lane lines touch the top of the pool rim so cables and or fittings do not contact the tile surface. The connection to the wall anchor, S hooks and turnbuckel shall be over the gutter.

D. Twelve (12) lifeline floats shall be provided for each life line. Lifeline shall be blue and white polyethylene rope. Lifeline rope hook terminals shall be connected to the lifeline by a fusion of the polyethylene rope in the conical shaped anchor terminal

2.48 BACKSTROKE MARKER POST AND RECALL POSTS AND CABLES:

A. The backstroke marker post shall be Pentair Part No. S12296B3 U bend 2 post station posts 1.90 X .145 T316L SS Powder coated with 6” deep stainless steel anchors 8'0" in length. The top shall be closed with an eye formed over the capped end. The eye shall be fabricated from 1/4 stainless steel rod. Anchors to be stainless steel 6” deep (non-threaded cap). Set anchors 15' from end walls for the 25 yard course and 5 meters for the 25M and 50 Meter course.

B. Furnish and install stainless steel plastic coated cable to secure the backstroke flags for each of the courses and shall be connected with a stainless steel S hook to the posts. Backstroke flags across all areas shall have plastic coated stainless steel cable, stainless steel spring and anti supertensioner with stainless steel hooks for attachment.

C. Backstroke marker posts shall include adjustable sliding collars.

D. The recall post shall be 4'6" in length and fabricated from low carbon type 304 stainless steel with 1.09 O.D. X .145" wall thickness. The post shall have a No. 3 finish or equal. The top shall be closed with an eye formed over the capped end. The eye shall be fabricated from 1/4 stainless steel rod. There shall be supplied a stanchion anchor Spectrum with removable cap (non-threaded cap). Spectrum anchors as indicated on the drawings. Line shall be constructed of 1/2" polypropylene red or yellow rope attached with a stainless steel S hook to the post. Recreonics Model #92-967. All bonding by Electrical Contractor

2.49 BACKSTROKE PENNANT LINE:

A. Backstroke pennant line shall be Nylon 12" X 18" triangular pennants with alternating colors. And individual numbers and letters spelling the school name or team name in the middle

section of the pool. Colors by owner. The pennant line shall be Recreonics 92-306 and 92-307.

2.50 MISCELLANEOUS EQUIPMENT:

A. The pool brush and holder shall be permanently attached. The pool brush shall be 18" long with nylon bristles and rigid back. Holder bracket shall be of cast aluminum and shall be designed for easy attachment to standard 1-1/4" aluminum handle. Recreonics Model #10-135

B. Skimmer head shall consist of dual edge metal and plastic with fiberglass screen. Integral handle bracket suitable for quick attachment to a standard 1-1/4" diameter handle using bolts and wing nuts. The standard nylon net shall be attached to the groove and spline method. Net is 20" X 6" X 12" depth. Recreonics Model #10-118

C. There shall be 1 white life ring buoy furnished. Ring buoy shall be 24 inches in diameter and shall be made of foam styrene covered with heavy canvas duck, manufactured under codes and supervision of the U.S. Coast Guard. Ring buoys shall have 90' of 3" throw rope attached. Recreonics Model #12-252 White in color

D. Provide (4) four rescue tubes 2 made of closed cell Ensolite with heavy duty orange vinyl skin, quick release buckel and 6' tow line. Recreonics model #12-291. Provide 16’ rescue pole with blunt ends and life hook. Recreonics model # 12-239

E. There shall be one large first aid kit ARC approved. Recreonics Model No. 12-048 with minimum of 100 units of adhesive bandages, 2 units of 2” bandages, 100 unit of 3” bandages, 1 unit of 4” bandages, 2 units gauze pads 3’x3”, 1 unit of gauze compress 18”x36”, 2 units of gauze compress 24” x 72”, 2 units of 4” gauze roller bandages, 2 units of triangular bandages, 1 scissors, 1 tweezer, 2 ice packs, 2 latex disposable gloves, 1 plaster tape, clean up kit for blood spills Model No. 12-041. whistle Model No. 12-357, two each (4 total) resuscitation masks Model No. 12-438, 12-444.

F. Furnish Blood borne Pathogens Kit with gown, gloves, face mask with eye shield, plus body fluid clean up supplies. Recreonics Model No. 12-041

G. CJ Spineboard with nylon straps, head immobilizer, body straps, side roll ups, body straps, head straps, adhesive strips and staples. Spineboard shall be 76” X 20" and constructed of 5/8” marine plywood with capped wood runners. Capped foot and head bumpers. Handholds shall be cut into the board around the perimeter in 14 locations. Runners shall be installed on the underside of the board to raise the board 1/2" when placed flat. Recreonics Model #12-325

H. Furnish 12’ safety pole constructed of fiberglass with blunt ends and shepards hook. Recreonics Model No. 10-371 and 12-239.

I. Furnish spectator stanchions with intermediate chain. Mr. Chain heavy-duty model stanchions shall be substantial round posts with a 32" overall height and 2" in diameter. Compliment the post with a 3" diameter large ball top. Base shall be 16" in diameter. Furnish 18 (@6' apart) stanchions and 110' of plastic chain. Color by architect.

J. Furnish 12’ safety pole constructed of fiberglass with blunt ends and shepards hook. Recreonics Model No. 10-371 and 12-239.

K. Furnish (3) Equipment Totemaster Model No. Recreonics 92-310.

2.51 POOL LIFT:

A. Furnish and install anchor only for each pool for a future Splash Pool Lift with anchor from SR Smith. Lift shall be furnished complete 24 volt rechargeable battery. Furnish lift with battery recharger and spare battery. All controls shall be waterproof with all operations being controlled by the push of a button. Lift shall provide 400 pound lifting capacity except extended reach which would be 300 pounds.

2.52 DECK DRAINS:

A. Pool Contractor shall furnish slot drain as indicated around the perimeter of the pool deck and grouted into place by the Tile deck contractor. Slot drain shall be as manufactured by NDS nominal 4" x 3" Channel Drain or Zurn linear drain. Form trench with additional furring of trench into concrete deck to allow for minor adjustment for non-cut tile to the edge of the trench drain. Drain to have 2" dropouts connect to pipe below. Pool Contractor shall furnish all necessary couplings, cleanouts and dropouts required to complete the installation. Furnish and install 4" pipe below pitched at 1% to 2% to deck drain overflow sump in pool equipment room. Deck drain trench drain to be grouted into place. Deck drain connections shall be sealed with 100% silicone before grouting into place.

B. As with the control joints in the Pool Deck the tile Contractor shall caulk around both sides of the trench drain using a ¼" X ¼" Deck-O–Seal caulking. Tile contractor shall grout Drain into place and verifying proper height and straight run for the slot drain to achieve a clean straight line of uncut tile. Cleanouts and vents shall be provided as indicated on the drawings around the perimeter of the deck. Deck shall pitch 1 to 2% to slot drain and no puddling shall occur.

1. Furnish and install Deck-O-Seal Gun Grade #785 two-part sealant at the edge of trench drain and tile with ¼" X ¼" seal with Deck O Seal to match flush with drain and tile. Deck-O-Seal is a flexible sealing compound. Material conforms with Federal Specifications A-A-1556A, Type M Grade NS Class 25 NT, CRD-C-506 Type II Classes A&B, ASTM C920 Type M Grade NS Class 25NT. Color by architect. Deck-OSeal is a Division of W.R.Meadows Hampshire, Illinois.

C. Tile Contractor shall grout slot drain into place and verify height and straight run for slot drain to achieve a clean straight line of uncut tile. Cleanouts and vents shall be furnished and installed as indicated on the drawings around the perimeter of the deck. Furnished to the equipment room concrete contractor in the equipment room. Piping into deck drain/ overflow sump by the Pool Contractor. Deck and deck slabs shall pitch 1 to 2% to slot drain and no puddling shall occur.

2.53 POOLS EXCHANGERS AND THERMOMETERS:

A. Coordinate location of exchanger and controls. See another section for heat source, pump, piping, temperature control valve, thermostat and high limit. Controls shall be installed with immersion wells with High limit to include an automatic shut down in the event of high temperature or power failure. Furnish and install at the Pool Contractors direction wall mount heat exchangers for Competition Pool, Family Pool and Spa. Minimum BTU's based on a minimum of 130 degree source temperature shall be based on Alfa Laval Plate Heat Exchanger:

1. (2) 50M Competition Pools @1,000,000 BTU – Model No. CB90DWAQ-70H-F, 2" NPT, total flow 72 GPM hot and 72 GPM cold, Inlet temperature 140 hot, 78 cold, outlet temperature, 118.8 hot and 98.9 cold, pressure drop 6.32 hot and 7.08 cold.

2. Therapy Pool, Diving Pool and Warm Pool @400,000 BTU – Model No. CB90DWAQ-44H-F, 2" NPT, total flow 48 GPM hot and 48 GPM cold, Inlet temperature 140 hot, 86 cold, outlet temperature, 118.8 hot and 107 cold, pressure drop 5.36 hot and 6.08 cold.

B. Furnish and Install Alfa Laval Plate Heat Exchanger **Double Wall** stainless steel 316 material plate with copper brazing. Connection material shall be stainless steel. Exchanger shall be brazed plate heat exchangers custom designed brazed exchanger with the required number of plates based on duty requirements. Design shall include fluid media, temperature profile, flow range and hydrauilic conditions. Pressed metal plates are assembled in plate packs with embossed pattern being reversed to every other plate providing a lattice type contact. Each pair of plates form a channel. The stainless plates are brazed with copper in a high temperature furnace. Max working temperature is 300 degrees with a minimum working temperature of -300 degrees. Maximum working pressure is 200 psig with test pressure at 300 psig. Boiler pressure drop is 4.91 to 7.08. Exchanger shall be U.L listed. Exchangers shall have stud bolts for mounting. Minimum Connections shall be Stainless.

1. Alfa Laval Inc., Richmond Va 23231, Beau Sarosy, 804 236 1372

C. Pool contractor to furnish and install T's required for temperature probe, high limit and flow switch. Flow switch, high limit sensor and controls shall be incorporated into the system and close the control valve under lack of flow and high temperature conditions by other than pool contractor. Minimum of 5' of CPVC piping in and out of exchangers. Pool Contractor to furnish and install influent, effluent, bypass, immersion well with T's.

D. Thermometers shall be installed on the influent and effluent of each exchanger between the bypass valve and the heater influent and effluent valves. A third thermometer shall be installed downstream from the mixed effluent water. Thermometer shall indicate temperatures to the nearest 2 degrees Farenheight in the operating range. Set thermometers so the operator can read temperature straight on at eye level or below. Stainless Steel case and stem thermometers shall be installed in stainless steel wells. Readings shall be 40 degrees to 130 degrees. Thermometers as manufactured by Trerice.

E. Pool contractor shall furnish and Install all bypass piping with valves.

1. Pool contractor to furnish and install T's required for temperature probe, high limit and flow switch. Minimum of 5' of CPVC piping in and out of exchanger flanged with stainless steel hardware to PVC with bypass. Furnish and install influent, effluent, bypass, immersion wells with T's. Pool contractor shall also use a stainless steel threaded flange to CPVC flange with stainless steel hardware for connection to the CPVC flange.

2.54 MEDIUM PRESSURE UV SYSTEM:

A. All pools shall receive an integrated water treatment control system shall provide continuous monitoring and control of sanitizers, oxidizers, pH, temperature, UV and system flow rate. Installation of the system shall be per the manufacture's specification. A factory trained/authorized representative shall provide training to the owner. This Section includes pools chemistry control and monitoring consisting of a Chemistry Controller, Flowcell Assembly, Sensors and Communications. System is a programmable Pool Chemical Automation System furnished and installed for continuous monitoring and control of the recreational water chemistry and related disinfection equipment.

1. New Competition Pool Shall be Model No. 3X3A, Part No. 7781588, 3 lamps, 9,000 watts, 12" diameter, FLA amps 14/480 3Ph
2. Existing Competition Pool Model No. 2X3A. Part No. 7781579, 2 lamps, 6,000 watts, 10"

diameter, FLA amps 14, 480V 3Ph

3. New Diving Pool shall be Model No. 1X2A Part No. 7781582, 2000 watts, 6" diameter, FLA 12/10, 208/240 single phase.
4 New Therapy Pool shall be Model No. 1X2A Part No. 7781582, 2,000 watts, 6" diameter, FLA 12/10, 208/240 single phase

B. The water chemistry control system for each pool shall provide Continuous, real-time monitoring and control of pH, ORP; primary, secondary and supplemental disinfectants per the CDC Model Aquatic Health Code (MAHC), Free chlorine, total chlorine, combined chlorine, bromine, chlorine dioxide and ozone concentrations in PPM, UV dose, system flow rate, and water chemistry balance calculations and other readings and control as deemed necessary for the project per this section. The controller shall manage the recirculation pump on/off status.

1. Controller shall control acid feed, CO2 feed and chlorine feeder.

C. The manufacturer shall provide a separate NEMA 4X enclosure to allow field installation all line-voltage and control wiring for all related and controlled equipment by the specified controller. The separate NEMA 4X enclosure shall eliminate the need to access to the chemical controller's electronics. For safety, liability and overall system integrity the referenced wiring box must be provided by the chemical controller manufacture.

D. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the Owner and the training shall be video recorded as stated in the project contract documents.

1. The controller system shall be NSF® Standard 50 listed for automatic controller equipment for swimming pools, spas, hot tubs and other recreational water facilities.
2. The controller system shall be certified to UL61010/IEC61010 standards and manufactured in an ISO 9001:2000 facility.
3. The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer/oxidizer level within +/- 0.1 parts per million (PPM) or +/ - 10 mV (millivolts) of Oxidation Reduction Potential (ORP) the pH within +/- 0.1 pH unit of the set points selected by the operator
4. All set point and calibration levels shall be adjustable with a keypad mounted on the front panel of the unit as well as the remote interface
5. The controller shall use pH sensor with +/- 0.04 accuracy in the operational range of 6.8 – 8.2 as certified by NSF an ORP sensor with an accuracy of +/- 3% mV as certified by NSF, a free chlorine and total chlorine sensors that operate in a range of 0.1 parts per million (PPM) up to 10.0 parts per million (PPM) within a 9% accuracy as tested by NSF or other third party certifying agency, be capable of actuating all outputs in the following operator selectable modes: off, manual, automatic, proportional PID (Proportional+Integral+Derivative) control, must be able to interface pulse output chemical feed pumps for true PID control to ensure chemical conservation. Programmable events can be time set to occur daily, weekly, or monthly.
6. The controller shall be supplied with ORP, pH, temperature, TDS, and free chlorine and total chlorine sensors for indoor applications. All outdoor bodies of water shall provide OPR, pH, temperature with optional cyanuric acid and/or hydrogen resistant free chlorine sensors available for specific application use with stabilized water or saline pools.
7. The appropriate amperometric sensors to provide the capability of real-time monitoring and control of the PPM concentration of various primary, secondary and supplemental disinfectants per the MAHC such as but not limited to ozone and chlorine dioxide.
8. The controller must be capable of controlling UV system dosing based on a real-time combined chlorine as calculated by the readings from an amperometric free chlorine and total chlorine sensor. Therefore ensuring power savings and chemical savings when

interfaced with the UV systems. Controller must measure and control via real time combined chlorine levels. The controller must utilize simultaneous ORP and PPM control for managing both the quantity and quality of the sanitizer/oxidizer.

9. Controllers must have the ability to control simultaneously to ORP and PPM control points or that utilize an alternate chlorine set point or boost function and shall include a temperature sensor and automatic control of the heater/boiler.
10. The controller shall be capable of remote monitoring the recirculation flow rate of the system via with compatible mag meters eliminating the need for other flow monitoring devices. Additional to the sample assembly flow switch (interlock) the controller shall possess the capability of using a square wave flow signal as a supplemental chemical feed interlock to prevent the dosing of chemicals during a system low flow/no flow condition.
11. The controller shall be capable of accepting up to seven (7) square wave signaled flow meters, real-time monitoring of heat exchanger/tube bundle corrosion and alarm out should corrosion rates exceed standard mil erosion rates.
12. Include conductivity sensor for the purpose of TDS control via the assignment of one of the controller relays to control a field supplied dump valve, continuously calculate and display the Langelier Saturation Index and Ryznar Index using either sensor data and/or manual input for pH, temperature, total alkalinity and calcium hardness. The resulting calculated water condition shall be displayed on the main screen as either "Scaling", "Corrosive" or "OK".
13. The controller shall control and monitor the make-up water for the body of water and have the programmable option of blocking the feed of chemicals during any addition of water make-up water. As a part of energy management and water conservation the controller via its remote software package shall data log and provide water usage per day, week, month and year. System shall control and or log the make-up water use.
14. The controller shall have no less than 7 fully configurable digital inputs, 10 configurable analog inputs, minimum of 5 (115v) fully assignable relays, minimum of 4 fully assignable digital outputs, be capable of expanded capabilities with an optional input/output expansion card kit.
15. The controller and sensing flow cell shall be pre-assembled, pre-wired, and pre-mounted on a heavy duty PVC back panel by the manufacturer at the factory's production facility. All high voltage field wiring shall be through a separate NEMA 4X factory engineered and supplied enclosure that precludes direct access to controller electronics. All high voltage connections shall be clearly identified and a field wiring diagram shall be provided with the controller for installer reference. All controller high-voltage relay assignment parameters shall be programmed at the factory prior to delivery to installation location.
16. The controller shall include a sensing flow cell that is hydraulically designed to allow verified correct flow and consistent pressure across all sensors. Flow cell will be clear PVC that is modular in concept and have the flexibility to add supplementary water chemistry sensors as desired. The sensing flow cell shall include a safety flow switch sensor, water spigot, and isolation valves. Flowcell shall have a PVC body with two ½ - 14 FPT ports for potentiometric probes, two ¼-18 FPT ports for temperature probe and wash injection with a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC ½" isolation ball valves, PVC ¼" wet test valve and flow switch.
17. The flowcell safety flowswitch shall have the capability to be continuously monitored and data logged while being monitored and controlled via two-way remote communication and real time remote viewing of the sample line flow switch via the internet.

E. The controller shall have as a standard feature an HTML server that allows full two-way remote communication and fully control of all parameters. The controller shall be accessible with a standard internet browser using a fully interactive Ethernet TCP/IP graphical interface that includes security access codes. The controller shall be capable of providing real-time monitor

and control via a personal computer, smartphone, or tablet device. The controller shall include downloadable software that is capable of providing real-time auto polling, data logging, email and text alarms and provide both graphical and report formats. The controller shall include programmable high and low alarm levels for all control functions with operator-selectable feed lockout and alarm buzzer options. The controller shall be standard with e-mail and text out alerts on alarm activation. The controller shall also email out notification user defined if it any automatic control feature is deactivate or changed at tat the site by an operator. The controller shall have the ability to allow field upgrades and updates and programming as needed.

F. The control system shall be provided with on-site start-up, on-site operator training performed by a representative trained and authorized by the controller manufacturer. Manufacturer shall supply an operation and maintenance manual describing features, operating instructions, maintenance procedures and replacement parts.

G. Information herein is based on Pro Minent Fluid Controls - Pittsburgh, PA (412) 787-2484

H. The controller electronics shall be covered by a standard manufacturer warranty of five (5) years. ORP and pH sensors will be covered by a standard two (2) year warranty. Other sensors and parts shall be covered by a standard one (1) year warranty.

I. Controller shall be hooked up to a dedicated 110 volt 20 amp circuit from the pool control panel with connection. Controller shall interface with the circulating pumps to turn off the controller and chemical feed pumps when the pump is shut off or in the event of a power failure. This is over and above the built in flow switch.

2.55 DIVE STANDS AND DIVING BOARDS WITH DIVING SPRAYS:

A. (3) Three One meter short diving stands shall be Durafirm Arcadian Catalog #70-231-524 one meter stand and Durafirm Arcadian Catalog #70-231-900 anchors and One meter diving platform centered between the diving boards. Diving Boards shall be raised @270 degrees and out of reach when platform is in use.

B. The diving stand shall consist of heavy aluminum castings dipped in iridite chromic acid solution followed by a 20 mil coat of baked epoxy. The roller tube and tracks shall be heat treated extruded aluminum processed by Alcoa duranodic hard anodizing process. The bearings for the roller tube and slide shall be nylon with grease fittings, adjustable and field replaceable. The diving board anchor hinges and pins shall be heat treated aluminum forgings with a design tensile strength of 35,000 P.S.I. and shall receive Alcoa duranodic hard anodizing. Hinges shall be designed to allow 180 degree rotation of the diving board to the rear of the stand. Hinges shall be mounted on a transverse casting machined to allow 7 leveling positions in one inch increments. The diving board anchor bolts shall be 5/8" diameter x 3-1/2" long silicone bronze.

C. Custom 1.9” OD X .065 wall X 316L Passivated Stainless Steel Rails around the Diving Platform with Powder coat. The rails shall extend on both sides of each board to the edge of the swimming pool with rail ends being turned back to line the return up with the intermediate rail around the platform. Each stand shall be designed for mounting on the concrete base using 8 Durafirm Arcadia catalog #70-231-900 bronze deck anchors which shall be furnished and installed. Custom rails shall be a product of SR Smith products.

D. Diving boards shall be Arcadia Air Products, Maxiflex B Catalog #66-231-330 aluminum extrusion type spring board. Diving board shall be 16’ long and 19-5/8” wide. Diving board shall be constructed of basic ribbed one piece extrusion, heat treated for minimum tensile strength of 50,000 psi of aluminum alloy #6076-T6. It shall have a torsion box extrusion, anchor end cap extension and tip end cap extrusion riveted to basic section.

E. Furnish and install diving sprays as indicated on the drawings centered under each diving board. The sprays shall be controlled from a control valve located in the filter room.

F. One meter platform sections are being covered with 12 mm Dive Tex vulcanized rubber surfacing from springboards and more. Color by architect. Material shall be installed with a Polyurethane Adhesive in accordance with the manufacturer.

2.56 EYEWASH SHOWERS:

A. In both filter rooms Furnish and install Haws Model 8336 epoxy coated, corrosion resistant with 9201E mixing valve and combination shower and eye/face wash including Axion MSR hydronamic designed ABS plastic showerhead with self-regulating 20 gpm flow control, green ABS bowl, ABS plastic Omni-flow wrap around eye/face wash with integral dust cover, chrome-plated brass in-line 50x50 mesh water strainer and chrome plated brass stay open shower and eyewash ball valves equipped with stainless steel ball and stem. Unit shall also include powder coated cast-iron 9" diameter floor flange, universal sign, 21" self-adhesive high visibility safety green and bright yellow stripe and 1 1/4" IPS supply. Verify location as indicated on the drawings with the owner/operator. Mechanical contractor shall provide hot and cold water with the Pool contractor installing 1 1/4" tempering valve for tempered water to the chemical storage area.

2.57 FIBERGLASS BULKHEADS:

A. Sizing

1. Provide moveable pool bulkhead fabricated to match the design shown in the plans. The bulkhead must span the width of the pool in monolithic one piece.

   a. Bulkhead (2)- 4': The dimensions are nominally 4 feet 0 inches wide by 82 feet 0-3/8 inches long and 5 feet 0 inches tall with 12 inches above water level. The top of the bulkhead must have a non-skid surface and be designed as a walkway and must be flush with the end walls of the pool as shown and extend over the gutter on the side walls to within minimum 1-1/2 inches of the curbs. Refer to drawings.

B. Material

1. Provide a complete fiberglass (vinyl ester resin) moveable bulkhead system (stainless steel systems will not be accepted) which is entirely manufactured and installed in monolithic one-piece double box construction (monocoque or sectional construction will not be accepted) and is entirely constructed of materials which are unaffected by corrosion when exposed to the chlorinated swimming pool conditions. Paint or protected coatings to cover materials whether they be internal or external areas of the bridge to prevent corrosion are not allowed.
2. The moveable bulkhead system in its original solid state must be permanently compatible with the chlorinated swimming pool conditions. The use of carbon steel, mild steel, alloy, aluminum, magnesium, copper, brass, or wood for structural sections, fasteners, hardware or parts of the bridge will not be allowed. **Bulkheads built with any type of structural fasteners (bolts or rivets) will not be accepted.**

C. Anchor Connections

1. Pins: Bulkhead manufacturer must supply anchor pin assemblies and support structure integral to the bulkhead, and be responsible for coordinating proper alignment, operation,

and support of the bulkhead on the gutter curb, as well as its locking mechanisms that will rigidly set the bulkhead at each parking location. Bulkhead anchors must provide adjustment mechanism to precisely locate bulkhead. Bulkhead manufacturer to supply the quantity of gutter or deck pin receptacles as shown on the drawings and installation of the receptacles in the gutter system or deck at each course length must be installed as shown on the drawings.

D. Bulkhead must be designed to support a unified live load with ½" maximum deflection in addition to dead loads of 5600 lbs on bulkhead walk area without the assistance of constant foam or additional air to assist with the support of such load. The Safety Factor for all live and dead loads must be at least minimum of 10. In addition, the bulkhead must be designed to withstand a uniform lateral live load of at least 30 pounds per linear foot and a point load of at least 500 pounds at the center with a maximum deflection of ½". Racing cup anchors must be designed to resist pullout loads of at least 400 pounds each.

E. Bulkhead must feature flow through openings at waterline to allow for 100% of waves to pass through the bulkhead. Opening will also allow for a handhold.

F. Variable Buoyancy: Moving the bulkhead must be easily accomplished by one person at each end of the bulkhead. Internal air chambers will be provided as means of reducing the static weight and initial inertial resistance (bulkheads using force for full movement will not be accepted). Internal air chambers will be so constructed that when adding air volume (bulkheads needing air pressure will not be accepted) to raise the bulkhead for change in position it must have the means to balance and eliminate the need for removal of the staring platforms. Bulkhead must glide freely on corrosion proof guides or skid plates both at gutter lips and side walls (wheels or tracks will not be accepted). Bulkheads that have to maintain buoyancy at all times will not be accepted. Manufacturer to provide equipment, including blowers necessary to operate flotation chambers.

G. Racing lane targets will be supplied on both sides of the bulkhead as indicated for each course provided in the pool drawings. Lane targets must be non-skid and coincide with lanes on the pool floor and markers on the pool walls.

H. Bulkhead shall be fitted with (10 DUAL POST SR Smith anchors) stanchion anchors for racing take-off platforms in the locations noted and in the positions required by the manufacturer of the selected take-off platforms (coordinate racing take-off platforms manufacturer and style with bulkhead manufacturer). The stanchion installations shall be reinforced by means of traveling through a secondary shelf/layer at waterline to eliminate any deflection under the maximum loading conditions recommended by the take-off platform manufacturer.

I. Removable guard rails shall be pro: Provided at both ends of the bulkhead. Rails must be custom fabricated of one continuous length of tubing. The tubing must be of type 316L/304L stainless steel, 1.90 inch OD x .145 inch wall thickness polished to 320 grit finish. Each guard rail must be located far enough (greater than the width of the pool gutter) toward the center of the bulkhead that they avoid conflict with the pool grab rails and starting platforms. Removable guard rails must be located as shown on drawings.

J. Bulkhead to have racing lane line anchors at waterline along both faces each of the bulkhead as shown in drawings. The cup anchors must be supplied with a 316L/304L stainless steel pin for attachment.

K. Suitable provisions for electronic timing system must be provided. Access hatches must be included at both ends of the bulkhead to facilitate inspection of the interior of the bulkheads,

anchor mechanisms, and to allow for future installation of wiring in an existing raceway gutter to carry electronic timing cables and conductors.

L. Bulkhead to not have men's and women's water polo boundary line anchors as shown on the drawings. The cup anchors must be supplied with a 316L/304L stainless steel pin for attachment.

M. Bulkhead shall not have additional lane line anchors as shown on the drawings to provide the pool with additional practice lap lanes.

N. Bulkhead shall feature openings to accommodate 78" touchpads on both/one sides as shown on drawings. Typical opening can accommodate pad width equal to width of lane minus 20". Custom openings can accommodate pad width equal to width of lane minus 10".

O. Typical Deck To Water Level (DTW) is 12" with 6" tall opening. Custom DTW can accommodate down to 8" DTW with 3.5" opening.

P. Bulkhead shall feature a toe ledge as shown on the drawings. The toe ledge shall allow water to flow through the bulkhead to ease moving of the bulkhead. Typical opening is 5'9". Custom openings can accommodate 18" minus width of lane.

Q. Bulkhead must feature as shown on the drawings a fixed skirt / flow through extension at the base of the bulkhead extending to within ½" of the pool floor on one side of the bulkhead.

R. Field surfaces must be slip resistant non-skid surfaces. To include black wall targets and white field surfaces.

S. Manufacturer

1. The owner and designer have performed a detailed investigation of the requirements of the bulkhead for this facility and have selected the following as basis of design. All bids should include only the bulkhead as specified herein.
2. S.R.Smith Stark Bulkheads - phone: (800) 824-4387, fax: (360) 403-7807, email bulkheads@srsmith.com.

T. Guarantee

1. Guaranteed that on completion of the installation, the bulkhead will move feely from one location to the other, providing walls are straight and parallel and do not vary more than plus or minus 1/2 inch and will not rack or bind/stop when moved.

2. The manufacturer shall provide the owner a separate (3) year warranty on the movable bulkhead from the date of installation. The movable bulkhead shall be free of defects in materials and workmanship (blistering, corrosion, rust, etc.) when used in accordance with manufacturer's installation and operation instructions. (warranties with water chemical balance or ventilation clauses will not be accepted) The warranty does not include or cover abusive or improper treatment by others. WITHOUT THE REQUIREMENT OF SCHEDULED INSPECTIONS AND OR SERVICING FROM THE MANUFACTURER.

3. The entire bulkhead shall be guaranteed with a non pro-rated warranty against structural defects (delamination, weakening of structural supports, etc.) to which changes structural requirements for a period of twenty-five (25) years following installation WITHOUT THE REQUIREMENT OF SCHEDULED INSPECTIONS AND OR SERVICING FROM THE MANUFACTURER.

U. Installation of Bulkhead

1. Bulkhead must be shop fabricated and delivered in not more than one piece. The bulkhead must be installed per manufactures instruction.
2. Include costs for installation onto pool gutter, adjustments, certification of parking dimensions and cleanup upon completion.
3. The installation must be true, level, and plumb with the existing structure to permit full range of movement.
4. Suitable means of anchoring the bulkhead must be provided to resist dead and live load components in the gutter system. Provide the anchor plates at the park positions shown on the drawings. Pin receptacle at each park position must be similar to Stark Model Number SB501 or SB2PVC5. Provide necessary instruction and coordination as required to coordinate anchorage installation.
5. Provide and locate the anchor pin plates at each parking location and at end walls. Race-course dimensions must be field certified in compliance with the competitive standards having jurisdiction and submitted to Owner/Architect in writing by the certifying engineer or land survey.
6. During installation protection must be provided for the existing deck, pool walls, pool floor, and general building construction. Include cost for replacement or repair as a result of damage by neglect.
7. The bulkhead shall be self-supporting, not requiring jacks for support when the water is removed from the pool. The bulkhead shall be placed only where the gutter system has added bracing to support bulkhead whenever the pool is empty. The instruction for the storage location shall be included in the procedures for emptying the pool as mentioned in this section.
8. The bulkhead must not be moved until water is in the pool and at the level of the gutter lip.
9. Provide factory trained and experienced personnel for coordination, consultation, and instruction for the actual bulkhead delivery and for training of the Owner's personnel in the use, operation, and maintenance of the bulkhead.
10. The exposed surfaces shall be free of imperfections or irregularities. A field inspection by the architect/owner will be conducted upon completion of the installation to insure compliance before acceptance.

2.58 PUMP PIT STAIRS WITH HANDRAIL:

A. Stairs into new pump pit in new filter room shall have stainless steel rails leading down the stairway with all stainless steel hardware and anchors. The existing pump pit shall have new stainless steel rails with anchors around the entire pump pit except at the wall of the room. The existing pit shall have new step treads using the same materials as the new balance tank. Rails shall be set 12" apart.

B. All sumps shall be covered with custom cut FRP Grating with 1" bearing into concrete or over FRP unistrut installed with stainless steel hardware and holes as required for piping, rinse and backwash.

2.59 UNDERWATER POOL LIGHTS AND SPEAKERS

A. Furnish and install underwater lights in all pools. Furnish and install Intellibrit 110V 5g LED color pool lights in the Competition Pool, Diving Pool, Therapy Pool and Warm Water pool. Each pool shall have an optional controller for programmable color option. Furnish and install 3' of 1" CPVC Schedule 80 conduit on each niche solvent welded and water tight for connection by the electrical contractor to the junction box. Bonding and Grounding with #8 copper solid

wire to each light and niche shall be by the electrical contractor and in Accordance with current National Electrical Codes. Electrical contractor shall test all electrical conduits to each light and show the construction manager before and after the deck is poured the conduit holds pressure.

1. All conduits shall be pressure tested by the electrical contractor prior to pouring the deck slab and after deck slab has been poured. Electrical Contractor shall verify in writing that the conduit is sound and free from leaks.
2. Electrical contractor shall wind sufficient pigtail around each light to allow relamping above the surface of the water.

B. The Lubell Labs Underwater Loudspeaker 9484 PACKAGE INCLUDING, A9000 stainless steel wet niche (11.5" flange, 10" body X 7.5" depth, ¾" NPT) grille, 21007 loudspeaker, remains the most popular underwater speaker in the world since 1968, as it's patented design is louder and clearer than competing designs and products. This unique design (U.S. Patent #3,391,385) utilizes a dual-piston PVC over molded aluminum enclosure as the sound transducer, offering true pistonic operation and low Q in a compact corrosion-free package. Coupled with a powerful 8-cylinder piezoelectric engine (with efficiencies approaching 60%).

C. The included SP0604C4 Hayward stainless steel wet-niche (Lubell SKU A9000) should be installed at 6 foot (1.83 m) depth below the water. Niche must be bonded to Equipotential Bonding Grid per NEC 680.26 along with all metal parts of pool structure. Furnish and install 3' of ¾" conduit with #8 bond attached.

D. All lights and speakers shall be installed in accordance with the manufacturer and National Electrical Code. Furnish and install conduit with each solvent welded connection to be water tight. Test all conduit before pouring deck or installing any finishes. Seal all conduits with watertight two part solvent as required.

PART 3 EXECUTION

3.01 CONDITIONS AND RELATED:

A. Verify that all work stated in other related divisions to this section. Areas directly related to this section:

1. Section 02 00 00 – Backfill
2. Section 03 10 00 – Concrete Forming
3. Section 03 20 00 – Concrete Reinforcing
4 Section 03 30 00 - Cast-In-Place Concrete: Concrete systems.
5. Section 04 20 00 - Unit Masonry Assemblies: Cavity wall construction.
6. Division 05 - Metals - Structural steel, metal deck, and cold-formed metal framing
7. Division 07 - Thermal and Moisture Protection
8. Section 09 30 00 - Tiling: Wall tile and misc. tile in pool areas
9. Division 22 - Plumbing: Fixtures and piping, as applicable.
10. Division 23 - Heating, Ventilating and Air Conditioning: Mechanical systems, as

applicable.

11. Division 26 - Electrical: Electrical systems and components, as applicable.

3.02 LAYOUT OF POOL:

A. All work under this section shall comply with Division 3 Requirements.
   1. Place all forms to prevent sagging of the material during or after placement.
   2. Under the supervision of the contractor or site engineer batter boards and/or form boards shall be placed locating the perimeter of the pool structure.
   3. The beam at the top of the pool wall, which is a monolithic portion of the pool shell, shall be formed to the dimensions as shown on the drawing. The deck side of the pool shell must be constructed 1" min. above water level.
   4. A header shall be installed completely around the pool; the inside shall be securely anchored to insure dimensional stability. A taut cutting wire shall be anchored to ensure the dimensional integrity of the shotcrete structure.
   5. Cutting wires shall be placed at all intersections of pool radius and vertical walls and on floor place elevation pins to ensure dimensional accuracy of the structure.

B. The elevation tolerance of the pool shell especially the rim of the gutter shall be +/- 1/8". The horizontal and vertical surfaces shall be +/- 1/4". The 3'-6" planar surface around the entire perimeter shall be true vertical.

C. The length and width tolerance shall be + 1/4".

D. Thickness for floor and wall shall be + 1/4".

E. Advise Electrical contractor prior to pouring in the event he may need to bond any embedded items as required.

F. At pool layout the pool contractor shall verify in writing the relationship of adjacent areas to the square-ness of the pool with any discrepancies which could affect the layout of finish pool, deck or surrounding areas.

3.03 EXCAVATION:

A. The machine excavation and hand trim shall be carried on as one operation. Contractor is cautioned to maintain all required safety guidelines as indicated in OSHA guidelines. Any minor voids, which may occur due to over-excavation shall be filled with a rich mix of sand and cement to stabilize the soils in the area and not have an adverse effect on the building footing and or foundations. All excavation material is to be hauled off site. Additional backfill material shall comply with IDOT Class II and be installed in accordance with Section 02225.

3.04 SUB BASE AND PIPING:

A. Stone fill to be 12" of coarse washed Limestone aggregate in accordance with State Department of Transportation, ASTM D1557 without fines. Additional depths of stone must be installed to project any adjacent areas that could be affected by the excavation of the pool. Testing shall be performed under the pool base slab for minimum bearing capacity of 2,500 psf in accordance with the soils report and the documents.

B. Furnish and install non woven filter fabric below bottom excavation of pool(s). Fabric shall be product as manufactured by Terratex NO4 or Terratex SD soil drainage.

C. Underdrain piping to be PVC pipe to be placed at the deepest point of the excavation. Furnish and install 3" and 6" corrugated along with Sch. 80 PVC underdrain without filter fabric at the deepest point of the excavation as indicated on the drawings. Filter fabric must be below all drainage stone and up the sides to prevent contamination of the drainage base and drainage pipe.

D. Solid PVC Underdrain shall be installed to the manhole adjacent to the pool. Pool contractor shall connect to the 6" PVC Schedule 80 solid underdrain line under the pool and into the underdrain manhole.

E. Contractor shall furnish and install all piping in accordance with the documents. Piping is diagrammatic with conditions of installation based on the function of each piece of equipment and the overall performance of the systems. The piping crosses and does need to be offset based on performance and function. This contractor has control in methods of piping and installation requiring coordination with his shop drawings and staff. No pipe runs shall be supported off of any fitting and shall be fully supported by the sand fill below the pipe. No materials for pipe ends shall be allowed to enter any of the piping at any time. The installation shall be viewed as though the contractor is going to be installing piping systems at his or her own home and the expectation of such are an important aspect of this installation.

3.05 STEEL REINFORCEMENT:

A. Pool contractor shall submit with his shop drawings to the Structural Engineer in accordance with the details contained within the documents and as provided by the Structural Engineer. Pool contractor shall submit with his shop drawings typical reinforcing details and schedule for the complete pool and deck. Shell shall maintain structural integrity now and through the warranty period as stated herein.

1. All bars shall be standard size deformed bars equal to the requirements of the "Standard Specifications for Billet Steel, Concrete Reinforcement," intermediate grade, serial designation A615 steel reinforcing bars equal in the requirement of serial design A615 adopted by the ASTM.
2. Supports for the reinforcing shall be steel bolsters or brick chairs. All reinforcing steel shall be placed in accordance with drawings #4 bar minimum, Grade 60 deformed bars unless stated otherwise.
3. All bending of rods shall be in accordance with American Concrete Institute Code 318-83.
   a. Overlap all bars not less than 30 bar diameters.
   b. All corners shall consist of min. 30 overlap prebent bars front and back to secure the structural corners of the pool.
   c. Tie minimum of 50% of all centers.
   d. All minimum coverage of 1" to 2" walls, 2" minimum material between bars and 4" from subgrade.
   e. Tie all grounding/bonding bars for maximum coverage into pool.
4. Maintain continuity in reinforcing steel around all cutouts and pool shell penetrations.
5. All wall penetrations, lights, steps and drop outs shall be reinforced to maintain the continuity of the reinforcing steel.
6. Cantilever deck is part of the pool structure.
7. Transverse Reinforcing to be around all penetrations such as lights, dropout boxes and drains. Install reinforcing in ribs.

3.06 POOL FLOOR AND DECK CONCRETE WORK:

A. The pool are designed as a monolithic unit and shall have a poured concrete floor/slab and footing area and concrete sidewalls. See structural drawings for all details related to pool. Cantilever rods shall be #5's and be tied into the pool wall with cantilever rods a minimum of

4' into the deck around the entire pool keyed into the back of the pool wall. Deck thickness is 12" minimum in areas. Deck and under the trench drain shall be reinforced with minimum of #4 bars 12" OC both ways over minimum of 15 Mils ASTM E-1745 Class A, .01 perm or less poly film.

1. Pool walls shall bear on a thickened slab which is part of the monolithic pour of the pool floor. Pool deck shall rest into the pool beam key with bear on the pool beam as indicated on the drawings. Crack supression design shall be incorporated into the pool wall around the pool lights with steel remaining continuous and at right angles to the reinforcing steel.

B. Where wall joins the poured surface (at the pool floor) and at the shallow area of the pool, the steel reinforcing shall pass through the joints.

1. The minimum PSI on concrete pool floor and deck is to be 5000 PSI in 28 days. Pool deck shall vary in thickness from 12" to 5" minimum encasing anchors and deck drains in concrete. Prior to pour, Pool Contractor is to place pins or screed to insure proper thickness of concrete. The final finishing shall be floated to a texture, which will allow proper adhesion of the true base. Concrete shall be water cured for 7 days starting within 24 hours of completion of the pour.
2. A 6" X 3/8" Type 9 ribbed type with center bulb water stop as manufactured by Tamms Industries shall be installed at the intersection of the concrete floor and the sidewall along with a keyway for pool walls. Concrete in this area shall be left rough in texture and hydrated prior to covering.
3. Begin floating floor when water has disappeared while cutting down and filling. Do not work concrete to reduce strength or weaken the slab. Float with a wood float. Pool floor, walls and decks to be poured concrete only.
4. Pool is thickset tile and deck is thin set tile.

3.07 CONCRETE POOL SIDEWALLS:

A. Concrete shall be used for constructing the walls of the pool.

1. Concrete shall comply with the requirements of ACI 504R and 506.2
2. Testing will be performed by the owner in accordance with Section 01400.
4. Prior to concrete verify that all waterstops are in place before placing any material.
5. Contractor shall note dimensional tolerances of true, vertical, square and level.

B. Concrete shall be a combination of Portland cement, aggregates, sharp sand and water in a plastic state (low slump).

1. Do pour any concrete over areas that are wet, spongy or where water exists.
2. Use only potable water. In the event a high iron condition exists water must be trucked in so final finish is not caused to stain. Protect all adjacent areas and remove all splatter.
3. Dampen all dry areas.
4. Test cylinders shall be taken as stated in the concrete section of these specifications. A proven mix design shall be used.
5. Maintain a temperature of all surfaces of 40 degrees until maximum curing has been achieved.
6. Final placement shall be free of cracks.
7. Should conditions dictate remove or replace areas of repair with Sikadur Hi Mod or Sikastix.
8. No calcium-based accelerators shall be used.
9. Make sure all reinforcing has been properly placed prior to wall construction.
10. Mix design shall be submitted with shop drawings and prior to application.
11. Cement used shall comply with ASTM C150 Type I.

12. The total volumetric air content before placement shall be 3% (+/- 1%) as determined by ASTM C173 or ASTM C231.
13. Air entraining agents shall meet the requirements of ASTM C260, C231 and C457.
14. Maximum water/cement ratio 0.40
15. Maximum water soluble chloride content 0.15.
16. Minimum cover of 2".

C. Concrete walls shall achieve strength of 5000 p.s.i. at 28 days.

1. The foreman shall have had at least five (5) years experience with this Pool Contractor and have constructed at least one pool per year the size of this project or larger. Experience on ditch construction does not qualify.
2. The equipment must be capable of discharging mixed material to deliver a smooth stream of uniformly mixed material at the proper velocity.
4. Provide all proper alignment wires to assure true tight lines.
6. Start pouring from the bottom.
7. Those areas left for more than one hour or where material has hardened must be removed and free of loose particles.
8. Pour as perpendicular to the surface as work will permit to secure maximum compaction
9. Completely encase reinforcement using maximum layer thickness while avoiding sagging or cave-ins.
10. Cut all voids and replace. Concrete may be applied in cold weather provided the surfaces are not frozen and surfaces are not allowed to freeze for 28 days.

D. Pool contractor must fit the criteria under the qualifications. Water cure walls for 7 days starting within 24 hours of placement.

E. For concrete wall construction construct form work for exposed surfaces with plywood, metal, metal framed plywood or other acceptable panel type materials to provide continuous straight, smooth surfaces.

1. Finish in largest practicable sizes to minimize the number of joints and to conform to joint system.
2. Provide form material with sufficient thickness to withstand pressure of concrete without bow or deflect.
3. Treat surface to be finished to provide adhesion of finish.
4. Walls to be formed to the deck surface with a continuous pour to the bottom of the deck.
5. No horizontal wall joints are permitted.

F. Criteria for strengths to apply to concrete wall and floor construction.

1. Slump limits at point of placement to be not less than 1" nor more than 3".
2. Ready mix concrete shall comply with ASTM C 94.
3. When air temperature is between 85 and 90 degrees reduce mixing and delivery to 60 minutes.
4. Backup all butt joints to eliminate cement paste.
5. Provide crush plates where stripping may damage cast concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and the like to prevent swelling and for easy removal.
6. Provide temporary openings where interiors are of formwork is inaccessible for cleanout for inspection before concrete placement.
7. Provide ties so portion remaining within concrete after removal is 1" inside concrete and will not leave holes larger than 1" diameter in concrete surface.
8. Fill/cover all tie holes with non-shrink grout.

G. Comply with Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars".

1. Locate and install construction joints with a keyway at least 1 ½" deep.
2. Caulk with manufacturer approved material for submerged surfaces 1" X 1" deep in construction joint walls, slabs and footings. Manufacturers such as deck-o-seal or approved equal.
3. Apply non shrink grout in tooled joint.
4. Apply pool finish over the remainder of the joint.
5. Place construction joint perpendicular to main reinforcement.
6. Continue reinforcement across construction joint.
7. Provide waterstops as described in construction joints to form continuous diaphragm in each joint.
8. Make provisions to support and protect exposed waterstop during work.
9. Fabricate field joints in accordance with manufacturers printed instructions.

H. Do not use form oil, curing compounds or sealant on concrete to receive finish. Rusted steel forms will not be accepted.

I Deposit concrete continuous or in layers that will allow the concrete which has hardened to cause the formation of seams or planes of weakness. If a section cannot be placed continuously provide construction joints. Avoid segregation of concrete.

1. Do not use vibrators to transport concrete inside forms.
2. Insert and place vibrators vertically at uniform spacing not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into the proceeding layer. Do not vibrate lower layers that have begun to set.
3. Place concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joint. Where placement consists of several layers place each layer while proceeding layer is still plastic to avoid cold joints.
4. Strike off all areas to receive the adjoining section. Cut and patch as required with non-shrinking non-metallic grout.

J. For hot weather placement comply with ACI 305. Use chilled water if necessary to cool concrete being careful to not jeopardize the slump of the material. If necessary water cool reinforcing prior to installation of concrete.

K. A water test is to be performed upon completion of the shell.

1. Plug all openings and slowly fill the pool with water flooding the gutter. Allow the water to stand for 3 days.
2. Check the level every 8 hours. In the event of water loss repair or replace areas. Water loss greater than ¼" of water 24 hours after initial fill will be considered water loss.
3. Water cure all shell surfaces for 30 days commencing 24 hours after installation of the pool floor.
4. Test water shall be chemically neutral prior to draining to storm.

L. Upon installation of pool walls the pool contractor shall verify in writing the length, width and corner to corner dimensions of the Pool. If the tolerances with the finish require modifications to the structure the Pool Contractor shall present to the Structural Engineer and the Architect a letter indicating the procedure to follow to rectify any inconsistency.

M. Crack repair. Repair any cracks including hair line shrinkage cracks in floor, walls or gutter. Chip out 2” wide X 2” deep around crack and coat with Sikadur 32 Hi-Mod epoxy bonding agent. Install In-Pakt a Division of Intrusion Prepakt non-shrink grout over chipped out area.

3.08 RECESSED STEPS AND TRANSITION:

A. Recessed Pool steps shall be incorporated into the pool wall as indicated. All benches and ramp shall be incorporated into the Therapy Pool. All junctures at vertical and horizontal surfaces to have cove tile. Note: install deck anchors to allow for drainage through the bottom of the anchor (except any rails underwater). The finish deck surface is to be tile. Electrical contractor to leave pool contractor #8 solid wire for connection to rail anchors.

3.09 GUTTER AND TRENCH DRAINS:

A. It is the intent of the specifications that the swimming pool perimeter overflow system channel and trench drain flow and surface cleaning be maintained under all conditions of normal operation and that no water be discharged to waste except when cleaning the filters or emptying the pool.
1. Water shall flow by hydraulic gradient to the outlet converter(s) by gravity to the balancing point.
2. The system specified provides "in pool" surge capacity of one gallon per sq. ft. of surface pool area.
3. All dropouts including pipe ends around the step area shall be covered with a PVC grate as indicated on the drawings.
4. Furnish and install grate over gutter.
5. Grate shall be as manufactured by Grate Technologies with all end and tile finish pieces as required.
6. Set all grate with grating support PVC channels. GRATE MUST HAVE PLASTIC L ANGLES AT BOTH EDGES OF GRATE INSTALLED WITHOUT GAPS TO ADJACENT SURFACES. Set angle with Deck-O-Seal to match angle and or adjacent surfaces. +/-3" of ceramic tile shall be installed behind the finger grip to the grate.
7. Secure and install grate as per all manufacturers recommendations. Color by Architect.
8. The grate shall be supported continuously or on 6" centers and in accordance with the manufacturers recommendations (whichever is closer).
9. The edges of the concrete below shall be covered with the angles as furnished by the manufacturer so the structure below lines up with the edge of the angle.
10. Angle may be grouted into place with non-shrink grout and feathered into place in accordance with the specifications as stated under the gutter section herein.
11. No shims shall be installed to level or support the grate.
12. The grate and angle must line up with the back edge of the tile.
13. All anchorages shall be with stainless steel hardware.

B. The overflow channel shall be constructed of concrete.

1. Interior finish shall be steel troweled to achieve a smooth plaster type finish.
2. Any rough interior surfaces shall be ground and true coated with epoxy in accordance with the manufacturer to achieve a smooth finish.
3. The interior of the gutter upon completion shall be as smooth as new plaster, with the absence of voids, waves, irregularities, angles not shown, form marks or any other roughness or irregularities.
4. Paint interior with 3 coats of Series 66 Hi-build Epoxoline 2 epoxy paint as Manufactured by TNEMEC.

C. Leave finished gutter free of any loose debris. Interior surfaces shall be thoroughly cleaned with Trisodium phosphate free of dust, oil, paint, and other loose material or foreign matter before application of finish. The gutter shall be finished with Tnemec Series N69 Color Hi-Build Epoxoline Polyamidoamine Epoxy. Follow all procedures as directed by the manufacturer.

D. Clean all surfaces as stated above and in accordance with the manufacturer. Abrasive blast or sand referencing SSPC-SP13/NACE 6 surface preparation and Tnemecs surface preparation and application guide. Surfaces may be blasted or sanded with a disc sander making sure all areas have been properly prepared.

E. Prior to starting this process walk the pool with the manufacturers representative, owner and the architect. Each coat shall be lighter than the previous coat to assure the proper mil thickness and coverage.

1. First Coat: Primer shall be Series N69 Hi-build Epoxoline sprayed and rolled to a consistent coverage. Primer coat may be thinned in accordance with the manufacturer. Cure as directed by the manufactured.
2. Second Coat: Spray Apply and roll all surfaces with as full coat of Tnemec N69 Color Hi Build Epoxoline Polyamidoamine Epoxy. Allow to cure as per manufacturer before applying finish coat.
3. Final Coat: Spray and roll on all surfaces Tnemec Series 69 Color Hi Build Epoxoline Polyamidoamine. Additives may be added, Series 44-700, to Series 69 to accelerate cure. If added follow all procedures in accordance with the manufacturers recommendations.

F. Color to be black but all colors must be submitted and confirmed.

G. Furnish and install American Olean stretcher 2” wide.

3.10 POOL AND DECK FINISH:

A. Tile used in this section is based on Dal Tile. Approved Manufacturers are Dal Tile and American Olean. See Architects finish schedule for tile schedule. The finish for the step treads, shall be stretcher trim tiles. Top of common walls and all other areas shall be 2" X 2". Rim of gutter shall be Dal Tile Finger Grip. (all colors by architect) No cut tiles will be accepted, all transitions shall be made with manufacturer furnished pieces. Edge of all steps, edge of deck, common walls, step corners, step sides, bench corners, pool corners, wall to floor junction, benches edges with all step and bench edges being contrasting tile. No surface bullnose shall be used.

1. Furnish and install custom Graphics and or signage such as lane numbers 7” tall in accordance with the drawings.
2. Pool Deck is thin set
3. Pool is thick set
4. Depth markers shall be installed on face of cantilever

B. Leave finished tile area clean and free of cracked, chipped, broken or loose tile. Protect tile from all foot and wheel traffic for at least three (3) days after installation. Interior surfaces of the pool shall be thoroughly cleaned of dust, oil, paint, and other loose material or foreign matter before application of setting bed. Tile lanes, targets and other markings shall be as indicated by the Architect in the project finish schedule. Tile contractor shall walk the pool with the Owner or his representative prior to filling the pool. Any corrections shall be made prior to filling of the pool. Due to the method of fill for the pool the tile contractor is cautioned

to make sure the owner or his representative has approved the work due to the Owners expense in filling the pool. Should the tile be rejected in areas the tile contractor shall immediately repair or replace those areas to the satisfaction of the owner prior to filling the pool.

1. Align all joints to be parallel and/or perpendicular with all other surfaces. All joints shall be straight and uniform. See Dimensional tolerances in another section. Gutter and Waterline tile shall have a maximum finish tolerance of 1/16".
2. All materials shall be furnished and installed in accordance with all manufacturers recommendations.
3. No cut tiles shall be installed at any transition on the pool floor. If any non-manufactured edge is exposed it shall be protected by the adjacent tile and edge shall be ground to eliminate the sharp edge.
4. All surfaces to receive the final finish and or base coats shall have a rough to medium rough texture. Sandblast as required all walls and floor to achieve proper bonding to surfaces.
5. Furnish and install all tiles in accordance with the drawings and as listed in the Architects finish schedule and as stated herein. Supply 5% extra tile for all colors and trim.
6. Submit shop drawings for all tile work indicating Manufacturer, type of tile, elevations and where it will be used.
7. All tile shall be delivered in Manufacturers unopened, dry containers with unbroken labels. Seconds shall not be used at any time.
8. Maintain 70 degrees during all tile work using only potable water. Water shall not contain high iron content. If a high Iron content exists the contractor shall use water trucked onto site for the duration of the tile or finish work.

C. Pool(s) Finishes:

1. The finish for the Pool shall be all tile. Use unglazed tile for all floors, steps, step treads, and transitions. All edges, recessed steps, toe ledge and bench edges shall be contrasting stretcher pieces with contrasting tile.
2. Use unglazed tile for top of all steps and benches. Trim for all vertical to horizontal transitions shall be stretcher S-812, cove C-813 and SC-813. No Surface bullnose use S-813 for all transitions unless specified otherwise.
3. Submit all Tile Colors and layouts to architect including a mock up labeled with tile and colors to be used. Field colors for pool is white with all marking being Group 5 and custom colors. Deck tile Field is Group 3 and Group 5 color accents.
4. Use unglazed tile. Tile shall be in accordance with the Architects finish schedule.
5. Transition tile indicating a change in floor slope shall be uncut across the pool floor and up the side walls. Use Dale Tile 2" X 2".
6. Furnish and install unglazed stretcher pieces at the deck and steps around the pool.
7. Tile shall be set over a mortar bed shall be a consistent one part Portland cement to Four (4) parts damp sharp sand with additive TEC Xtra Flex additive to the mortar bed for increased strength, water resistance and flexibility. Minimum setting bed shall be 2". Prepare all surfaces to receive setting bed as stated above.
8. Seal all cracks or shrinkage cracks with Vandex Uni Mortar. Prewater several times so concrete is saturated surface dry (SSD) with no standing water. Any surface water must be removed. Follow all manufacturers recommendations for mixing and or installing. Coat all existing areas to a uniform appearance prior to installing bond coat or setting bed.
9. For markings see architects drawings and use 5" to 7" tall Dal-Tile unglazed deck tile with depth markers with warning bench below and all no diving shall be International 8" symbol with written No Diving in between each marker.

10. All benches shall have a 5" to 7" tall sign stating “bench 1'-8 below water" and no diving signage in between each depth marker for water depths 5’ and less. Depth markers with signage in the pool deck, shall be furnished and installed by the pool contractor. Behind each starting block in the pool deck shall be a number indicating lane number.

D. Setting and Grouting Materials is based on TEC 25 year system with waterproofing: Installers shall follow the strict requirements of the manufacturer. A representative of the manufacturer must be on site prior to and during the installation to go over all details as required for the installation.

1. All deck tile shall be thin set and grouted with modified polymer, caulked control joints with Pool being thick set and grouted with modified Polymer as specified herein.
2. Prior to placing any setting materials on pool floor lightly sandblast all surfaces and clean with a solution of muriatic acid. Final cleaning shall be Trisodium phosphate to remove all existing oils. The pool shall be thoroughly cleaned of dust, oil, paint, and other loose material or foreign matter before application of bond coat or setting bed. Match edges of all tile to adjacent tiles.
3. Furnish and install over all surfaces prior to setting bed HydraFlex Waterproofing crack isolation membrane. Substrate shall be finished with a fine broom finish at least 3 days prior. The concrete may have a maximum vapor emission rate of 12 pounds per 1000 square feet per 24 hours when evaluated by ASTM F!869 or 90% relative humidity per ASTM F2170. Where necessary existing concrete shall be prepared by mechanical methods such as scarifying, grinding, sand blasting or shot blasting. After preparation remove all dust by vacuuming. Apply a continuous membrane without voids of at least 46-50 mils wet film thickness is required over the entire surface. Pre-fill all concrete cracks. Apply membrane to entire surface using a 1/4" to 1/2" nap roller or V notched trowel. Membrane must be applied in two coats measuring the first coat periodically with a wet film thickness gauge to ensure a 25 mil thickness with a combined thickness of 50 mils wet curing to a dry film of 30 mils.
4. Flashing with TEC brand waterproofing Mesh is required at all substrate joints, field seams inside corners, outside corners, anywhere vertical surfaces meet horizontal surfaces such as benches, steps, ect. Flashing is also required at drains and or control joints. Flashing involves pre-coat of substrate intersections 4" either side then fully embedded wide waterproofing mesh in both directions into pre coated areas with 3" overlap on each side. Allow to dry for 30 to 45 minutes before full application.
5. Follow guidelines for curing. All cured surfaces shall be visually checked to make sure there are no bubbles or breaks in the membrane.

E. Super Flex - Premium Latex Modified Thin Set Mortar. Examine the conditions in accordance with Section 01710. Install work in accordance with the manufacturers approved product installation procedures.

1. Maximum variation from required plane for floor and wall surfaces is 1/4" in 10 feet.
2. Notify the architect of any unsatisfactory conditions.
3. All surfaces shall be structurally sound, dry, and free from grease, oil, paint, sealers, or curing compounds.
4. All surfaces must be free of hydrostatic water or moisture wicking.
5. Verify any expansions joints cold joints or cracks and that they have been properly addressed as indicated in the previous section under Hydra Flex Waterproofing and Crack Isolation Membrane.
6. Concrete shall have cured a minimum of 28 days. Any fines, laitenance, projections, and honeycombing must be removed.
7. Surface protrusions and tile glazes must be removed.
8. Cutback all adhesive residue to appropriate substrate.

9. Prime the surface as required with Primer and patch additive 861 following TEC brand product installation procedures.
10. Install Versa Patch Latex modified floor patch and leveler in accordance with TEC installation procedures.
11. Install EZ Level Self Leveling Underlayments in accordance with TEC technical procedures.

F. Crack Isolation Mortar:

1. Install 1Flex Crack Isolation Mortar in accordance with the technical procedures.
2. Install 1Flex Fast Set Accelerated Crack Isolation Mortar in accordance with TEC installation procedures.

G. Tile Work:

1. Install tile in accordance with the drawings and information as stated herein.
2. Tile should be straight and have edges aligned with adjacent materials. Grind all edges of cut tile.
3. Terminate tile as required including aligning of all joints.

H. Grout Installation:

1. Install TEC Power Grout in strict accordance with TEC brand products installation.
2. Install Power Grout 550 in strict accordance with TEC brand products installation procedures.
3. Seal grout with Guard All Invisible penetrating sealer in accordance with the manufacturer.
4. Completely clean all grout haze and residue from the surface.
5. Grout joints must be clean and free of standing water, dust or foreign material.
6. Protect from foot traffic, freezing and do not fill pool for 7 to 21 days in accordance with the manufacturers strict recommendations.
7. Check condition of potable water to make sure water is not high in metals causing staining of the grout to occur. If water is high in metals use only trucked in water for all setting and grout materials.
8. For markings use 5” tall Dal-Tile unglazed deck tile with depth markers with warning bench below and all no diving shall be International 8” symbol No Diving in between each marker. Non-skid symbol with no diving wording shall be as manufactured by Inlays.
9. All benches shall have a 5” tall sign stating “BENCH BELOW WATER" and NO DIVING signage in between each depth marker for water depths 5’ and less. Depth markers with signage in the pool deck, shall be furnished and installed by the pool contractor.
10. Depth markers shall be placed on the wall of the pools and the cantilever of the Competition Pool.

I. Pool Deck:

1. Seal all deck joints with Deck-O-Seal Caulking or 100% silicone caulking color to match tile. Follow all manufacturers recommendations for mixing and or installing. Coat all existing areas to a uniform appearance.

J. In the pool deck starting at the corners of the pool and any change in direction of pool shape. Furnish and install soft joints ¼” X ¼” at @15’ to 20’ intervals around the pool deck. Fill joint with Deck-O-Seal as described in another section and in accordance with all manufacturers recommendations.

K. Tile deck is to be installed with space temperatures of 80 degrees or greater.

L. Pool Contractor is responsible for filling the pool with the owners water. Filling shall take place at a rate of @1" per hour so as not to shock the final finish.

3.11 DECK DRAIN TRENCH DRAIN

A. Deck drains shall be encased in concrete and as with the control joints in the Pool Deck the tile Contractor shall caulk around both sides of the trench drain using a ¼" X ¼" Deck-O–Seal caulking. Tile contractor shall grout Drain into place using TEC products and procedures, as for the setting bed on the deck and in the pool verifying proper height and straight run for the slot drain to achieve a clean straight line of uncut tile. Deck shall pitch 1% to 2%, and no more than 2% in any given area to slot drain and no puddling shall occur. If puddles do occur you will be required to remove them. Boxed out plumbing connections shall be grouted into place while working with the deck drain piping contractor to connect the trench drain to the line below.

1. Furnish and install Deck-O-Seal Gun Grade #785 two-part sealant at the edge of trench drain and tile with ¼" X ¼" seal with Deck O Seal to match flush with drain and tile. Deck-O-Seal is a flexible sealing compound.

   a. Material conforms with Federal Specifications A-A-1556A, Type M Grade NS Class 25 NT, CRD-C-506 Type II Classes A&B, ASTM C920 Type M Grade NS Class 25NT.
   b. Color by architect.
   c. Deck-O Seal is a Division of W.R.Meadows Hampshire, Illinois.

B. Tile Contractor shall grout slot drain into place and verify height and straight run for slot drain to achieve a clean straight line of uncut tile.

3.12 BALANCE TANK, DRAIN SUMPS, DECK DRAIN/OVERFLOW SUMPS WATERPROOFING:

A. Prior to any work performed on any of the sumps or the balance tanks, balance tanks contractor/installer shall fill all divots, form ties or irregularities in the concrete tanks with a cementations non shrink coating as indicated in other Divisions.

B. Sandblast in accordance with the manufacturers technical bulletin all surfaces of the backwash tank and sumps.

1. Waterproof the backwash sump, deck drain overflow sump and balance tanks including the bottom side of the top and door edges of the balance tank with (2) two coats of Aquafin 1KM with a smooth finish. Waterproof the Surge tank including the bottom side of the top with (2) two coats of Aquafin 1K which is a cementatious ready mixed powder mixed with water to form a dense waterproofed surface barrier with a smooth finish. Product consists of Portland cement well graded quartz sand and polymer enhanced special chemical ingredients. Coat all areas with Super Aquafin (866 278 2346) a cementatious protective coating and waterproof barrier, resistant to moisture and abrasion. Clean all existing surfaces in accordance with the manufacturers technical specifications including bottom of deck and all sides of existing tank to bare concrete in accordance with the manufacturers technical information. All surfaces must be clean, sound and have an open capillary system.
2. Repair all cracks in concrete walls as described in another section.
3. Seal all joints several times so concrete is saturated surface dry (SSD) with no standing water.

4. Any surface water must be removed. Follow all manufacturers technical information or recommendations for mixing and or installing.
5. Coat all areas including the concrete cover and around the door to a uniform appearance.
6. Prior to installation of waterproofing a factory representative must be on site to meet with the contractor to approve the structure for installation of waterproofing and go over any last minute procedures to install the finished product.

3.13 CERTIFICATION OF COURSE LENGTH:

A. Upon completion of the pool certify with a record drawing with Engineers Stamp and under form USA Swimming Measurement Certification of Permanent Racing Course for each lane and each course in accordance with USA Swimming in conjunction with Part 4 of USA Swimming Rules and Regulations certifying in conjunction with Article 103 Facility Standards and NHSAA course length. Furnish to the owner certified by an Engineer licensed in the State a sealed detailed drawing of course length for each lane. At all of both end walls in a vertical plane extending 0.3 meters (12") above and 0.8 meters 2'-71/2" below the surface of the water. Length shall be measured and if touch pads are not in place it shall be so noted by the Engineer with reference to appropriate thickness of pad. Measure each lane width from rope anchor to rope anchor at both ends using a still wide metal retracting tape. Report the width of each lane to the nearest 0.1ft (1 ¼"). Measure all starting blocks from water surface to top front edge of each block. Report platform heights to nearest 0.02ft (1/4") noting any platforms that are deficient. Maximum height is 2'-5 ½". Measure backstroke flag locations, 15 meter marks, midpoint rope and all required information.

END OF SECTION 13 15 00

SECTION 13 15 60 - AQUATIC TIMING SYSTEMS AND DISPLAY SYSTEMS

PART 1 – GENERAL 1622

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of contract, including General and Supplementary conditions and Division 0 and 1 Specifications sections apply to work of this section.

1. Section 03 30 00 Cast-In-Place Concrete: Concrete systems.
2. Section 04 20 00 Unit Masonry Assemblies: Cavity wall construction.
3. Division 05, Metals Structural steel, metal deck, and cold-formed metal framing
4. Division 07, Thermal and Moisture Protection
5. Section 09 3000 Tiling: Wall tile and misc. tile in pool areas
6. Section 13 1500 Swimming Pool and Equipment
7. Division 22, Plumbing Fixtures and piping, as applicable.
8. Division 23, Heating, Ventilating and Air Conditioning Mechanical systems,
9. Division 26, Electrical systems and components, as applicable.

B. Coordination Items by other Divisions:

1. Power and data cable to all locations, system conduits verified by timing supplier at time of bidding, system data conduit and communication data to communicate and broadcast to any remote location.

C. Electronic timing and scoreboard system with multi sport capabilities for practice, instruction, competitive swimming events, diving, water polo, and synchronized swimming unless specifically eliminated.

1.02 DESCRIPTION

A. Timing and scoreboard system is based on Colorado Time Systems (CTS) with multi-sport capability used for practice, competition, diving, water polo, synchronized swimming and or individual monitors.

B. Furnish and install starting system integrated with electronic timing and scoreboard system. Wiring harness shall be incorporated into the system. Interface is with Division 26 contractor. Division 26 contractor shall furnish and install all subsequent rough in boxes, conduit and hookups behind the board.

1. (44) – 4” x 4” x 6” in-deck junction boxes (including start) ,
2. (6) 12” x 12” x 6” in wall junction boxes
3. (6) in wall quad power boxes at each 12 x 12 location
4. Interconnecting conduit for power and data
5. Wall and deck boxes
6. (3) in wall data box behind scoreboard/recordboard to feed data to scoreboard
7. (18) in wall power boxes behind scoreboard with 208V/20A circuits to feed power to main scoreboard modules
8. (4 total) (2) behind each record board 208V 20A circuits to feed each recordboard

C. Bonding and power required to any boxes as specified shall be furnished and installed by Division 26 contractor with Timing Manufacturer to verify system requirements to be incorporated into the project prior to bidding as well as verification prior to the start of construction and or installation.

D. All in deck plates and connections and interconnecting data wiring or data cables to operate the scoreboard system shall be by Scoreboard Supplier unless stated otherwise. Interconnecting wiring shall incorporate all functions as stated above into the facility. Shop drawings shall indicate all conduit sizes, rough in boxes, junction boxes, power requirements, scorer stations and confirmation of existing electrical drawings shall be furnished.

E. Furnish and install scoreboard complete with line lanes, place and time complete in accordance with the information as described herein.

1. A separate bid for the scoreboard and related as specified herein, to be held as an owners option.
2. Combined bids including the scoreboard and any other division will not be accepted.
3. Each bidder shall examine details related to the installation of the scoreboard and note any discrepancies in his bid form.
4. Discrepancies found after receipt of bids may disqualify the bidder or it will be assumed to be included as part of his bid.

F. Furnish and install FOB truck job site.

1. Bidder shall furnish and install two (2) in-deck aquatics timing systems complete, scoring and display system installed and capable of collecting and posting results for the 50 meter, 25 meter and 25 yard courses. Systems shall be capable of operating two systems/events
2. (2) Two Lap Tops with Hi Tek Meet manager software. Software is to be registered to the owner.
3. One (1) Scoreboard +/-48’ X 12.5’
4. Two (2) Record Boards +/-6.82’ X 12.07’
5. All boards are video capable

G. Timing, scoring and display system shall also be capable of scoring diving events and water polo matches as well as perform pace clock(s) functions. System shall include all cables and connectors to provide for a completely operational system including video and DVD display interface and software to provide information between the computer(s) and the console.

H. Timing is included in the 4’ bulkhead with 10 additional deck plates.

I. Two pool can be used at the same time.

J. All starting block locations shall be wired for timing.

K. Along with the scoreboard there are two (2) Model SP1400 pace clocks

1.03 ACCEPTABLE BIDDERS AND MANUFACTURERS:

A. Bidders are required to include any and all information as contained herein. Discrepancies found after bidding shall disqualify the bidder and he shall forfeit his security. Bidders clarifying their bids will be given the option of including a specific item or withdrawing his bid subject to all terms indicated in the documents. Bidder may include an interpretation with his bid along with any or all clarifications. After bidding any interpretations shall be made by a representative of the owner in favor of the owner.

B. Only bidders directly involved with the installation or installing components related to the scoreboard or related components required for the installation are acceptable bidders provided they are pre approved.

1. Any bidder must include in his bid a separate bid for all information as contained herein.
2. If bidding another Division, a separate bid for the scoreboard must be submitted.
3. Combined bids including the scoreboard and any other division will not be accepted.
4. Each bidder shall examine details related to the installation of the scoreboard and note any discrepancies in his bid form.
5. Discrepancies found after receipt of bids may disqualify the bidder or it will be assumed to be included as part of his bid.

C. Information as contained herein is based on: Colorado Time Systems, 1551 East Eleventh Street, Loveland, Colorado 80537-5056
Phone: 800 279 0111 Fax: 970 667 0988

1.04 SUBMITTALS

A. Submittals shall include the following:

1 Product data sheets.
2 Shop drawings detailing scoreboard data, scoreboard power, timing component conduit/junction boxes, timing power and Ethernet drops.
3 Warranty information.

1.05 JOB CONDITIONS

A. Manufacturers proposing to submit a quotation for the electronic timing and scoreboard system must confirm that all embedded items are compatible with the installation of their respective systems.

B. Contractor is responsible for review of latest revision of construction documents with Manufacturer for accuracy. Manufacturer must be notified 10 days prior to bid date for any conflicts or additions that affect Manufacturers scope of work.

C. Contractor to verify fitment of touchpads for all lanes, including fitment on bulkhead(s), cross course(s), and head wall(s). Touchpads are required to mount flush to pool wall in

across their entirety. Contractor to advise Manufacturer of any obstructions that would result in touchpad failure to mount flush to pool wall 10 days prior to bid date.

1.06 WARRANTIES

A. All warranties shall be joint between the manufacturer and the supplier so the owner receives a full labor an material warranty. Manufacturer shall warranty the completed installation of all systems in this section for one year.

B. Manufacturer shall warranty the scoreboard, computer console, touchpads, and starting system for two years.

C. Manufacturer shall warrant the deck plates for 5 years.

PART 2. COMPONENTS:

2.01 TIMING AND SCORING SYSTEM (GEN7)

A. The timing system shall employ topography of one communication bus to which all timing and connectivity nodes are connected and communicate with each other.

B. Connection points shall be production items and not a one off or prototypes.

C. Titanium contacts as exposed connectors are wet pluggable and electrically passive if not connected. No maintenance for corrosion shall be needed.

D. Self-test capabilities to detect compromised timing bus wire terminations and scoreboard bus wire terminations.

E. Printer shall be Brother laser printer or equivalent.

1. (2) Timing and scoring systems shall include Hy-Tek Pro meet manager furnished by the bidder and a meet manager port capable of bi-directional communication with the Hy-Tek Ltd. Meet Management system for downloading of results and event orders.

F. Provide one (2) Dell Latitude E5500 or equivalent lap top computer for Hy-Tek use.

2.02 TITANIUM DECK PLATES (TDPI-D2 IN-DECK)

A. (52) Titanium Deck plates (including bulkhead) to permit plug-in connection for touch pads, A, B, C, backup buttons, electronic relay judging, start light signal, start speakers and a signal to start the timing device at each lane. Each deck plate to be mounted flush with deck tile with a recessed non-corrosive titanium connector. Deck plate shall have flush surface to prevent injury to swimmers. Protruding connectors and covers are unacceptable. Seal all deck plates with silicone or rubber gasket to prevent water from going under plate or in deck box.

B. Carlon Junction boxes shall be interconnected with PVC conduit terminating in 4” x 4” x 6” Carlon Model No. E989NNR-CAR wall boxes with adjacent power.

C. Start system deck plates connects start system into in-deck system.

D. Start system deck plates must have built in diagnostics to detect anomalies with connectors (corrosion, shorts) and anomalies with the speaker or start system at setup and during use.

E. Start system deck plates must have titanium connectors and be wet pluggable and electrically passive if not connected.

F. Inputs/outputs for start system and speaker.

G. Detection of presence or absence of speaker or start system.

H. Self-test capabilities to detect compromised timing bus wire terminations.

I. Must be maintenance free other than normal freshwater rinse.

2.03 SERIAL WALL PLATE (R-1004-0549) – **(7)**

A. Wall plate(s) facilitate connection of timing equipment around the facility.

B. Wall plate(s) must allow for any, or all, of the following connections depending on location and usage:

1. Serial Timer Connection (WPI-T1).
2. Serial Start Connection (WPI-S2).
3. Serial Scoreboard Connection (WPI-SC5)
4. Serial Bulkhead Connection (WPI-BH4)
5. Fiber Connection (WPI-F4)
6. Serial RS-485 Connection (WPI-485)

C. Wall plate timing system components shall fit into a 12” x 12” x 6” PVC junction box. Acceptable manufacturer, Carlon (E989R-UPC) or similar box that will fit wall plate assembly of the following dimensions: 15” x 15” x 0.1875” +/- 0.05”. Wall plate timing junction box(es) and interconnecting conduit to be provided by electrical contractor.

D. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be 1.5” PVC.

1. TITANIUM SERIAL WALL PLATE TIMER CONNECTION NODE (WPI-T1) (3) Connection to timer and shall provide the following:

   a. Connectivity to all timing courses and one scoreboard bus with one cable connection.
   b. Detection of presence or absence of connected timer.
   c. Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts).

2. TITANIUM SERIAL WALL PLATE SCOREBOARD CONNECTION NODE (WPI-SC5) Connection to a scoreboard shall provide the following:

   a. Detection of presence or absence of connected scoreboard.
   b. Self-test capabilities to detect compromised timing bus wire terminations.

3. SERIAL WALL PLATE FIBER CONNECTION (WPI-L) (1) Connection to Colorado Time Systems LED Video Display and shall provide the following:

   a. Up to (2) ¼" jack ports, for legacy and RS-232 connections

2.04 CHAMPIONSHIP START SYSTEM – STANDARD (SS)

A. A single cable from wall plate to start system shall carry signal for driving up to 20 individual block speakers, 20 individual Colorado Time Systems Relay Judging Platforms with Speedlights and external strobe(s).

B. System shall use wired microphones and shall have a volume control on each microphone input.

C. Start system shall have a sturdy, all metal, non-corrosive enclosure, legs and tripod mount (TR-3)

D. System shall have external connections for additional strobe light(s), speaker output, start output, and Speedlights.

E. System shall run from external 12-volt/AC power adapter and have two (2) internal Gel cell batteries. The internal batteries will automatically be recharged while the start system is plugged in to the external power supply.

   1. Provide (32) SP-6/45 (6-watt, 45 ohm) reflex corrosion-resistant speakers with cable (one for under each starting block).

F. There will be an LED warning light on the system showing when the internal batteries are starting to get low on power.

G. Start system must be compatible with underwater speaker system (SP-UND).

H. Provide (2) 8M Start Cables (R-015-706-8)

2.04 UNDERWATER RECALL SYSTEM (SP-UND) AND AUXILIARY SPEAKERS SP-125

A. Provide (1) underwater speaker (SP-UND) and 40-watt 8 ohm auxiliary speaker.

B. Plugs directly into speaker output on Championship Start Systems (WSS & SS). Recommended for use at all facilities for entertainment, underwater instruction, and accommodation for disabled athletes.

C. 180dB sonic output, meets UL and EU specifications for low voltage underwater applications.

D. PVC constructed housing with protective cage. Rugged military-grade PVC and EPDM construction will not leak, rust, or corrode in swimming pool environments.

2.05 TIMING SYSTEM (GEN7 SWIM TIMER) QTY (1)

A. Timer shall be a standalone unit with physical connections to timing inputs. Timer shall be controlled by user interface device (computer or tablet) via USB or network.

1. Provide (2) 8-meter Timer Interface cable (R-015-715-8).

B. Timer interface (laptop computer, R-600-302) (1) shall be supplied with all necessary software to time and score swimming in compliance with the appropriate sanctioning body(ies): FINA, NCAA, YMCA, USA Swimming, and National Federation of High Schools.

C. Timer shall accept inputs for up to 12 lanes for a parallel wiring (legacy) installation and up to 32 lanes for a serial wiring installation.

D. Timer shall time to a user-selectable resolution from 1 second to .001 second. It shall take starts and finishes from the near end and/or far end of the pool. It shall accept inputs from the start system, touchpads, up to three manual backup times per lane, and relay judging platforms.

E. Timer shall be capable of performing system diagnosis, including the detection of corroded or partially shorted inputs and shall alert the user when inputs are no longer within acceptable tolerances.

F. Timer shall run off of a 12 Volt power supply connected to a standard 110/240 VAC outlet and will automatically switch to (and display on screen of connected interface device) internal battery source power, in case of line power failure without affecting the continuity and accuracy of the timing system.

G. Timer shall interface to single- and multi-line scoreboard and shall post immediate results to scoreboard in "Lane" or "Place" order (user selectable). The timer shall also have the capability to pull race results from memory and post those results to the scoreboard in "Lane" or "Place" order (user selectable).

H. Timer to include internal clock calendar with self-sustaining battery to time/date stamp all results.

I. Timer shall meet acceptable safety standards. Shall be ETL approved, or equivalent.

J. User interface shall display complete race status. The interface shall be capable of functioning as a miniature scoreboard displaying information simultaneously for all active lanes including lane number, current length in race or final place, split or finish time, relay judging status indicator, and backup time and backup button status.

K. All race data, including near and far end splits, shall be stored to internal memory for later recall to facilitate meet management connectivity and printing. Printed reports shall include cumulative and subtractive splits as well as relay judging times (when required).

L. Backup timing provides backup time via push button provided on a per lane basis should swimmer fail to trigger touchpad or touchpad fails to register. Timer to be capable of accepting up to three backup button times per lane.

M. Meet memory shall be capable of being transferred to external storage (via USB) or cloud data backup services (i.e. Drop Box, Google Drive, etc.).

N. Relay judging automatically compares the touchpad hit of an incoming swimmer with the starting swimmer's time of departure from the optional relay judging platform. Results display both "plus" and "minus" takeoff times and can be printed and stored in race memory.

O. Timer shall communicate with meet management peripheral software on a two-way "handshake" basis, enabling the meet manager's resident computer to query the timer's memory via the USB port or via the network at any time for any race results.

P. The system's Automatic Event Sequencer shall be capable of holding both standard and user defined event sequences. The event order will be able to be downloaded from meet management software. The desired order is user selectable. EVENT SEQUENCES with appropriate race distance and race description for high school, college meets, and two "User Defined" meets to permit construction of custom meets. USA Swimming, YMCA, and FINA. When recalled from memory, race distance and descriptions are automatically selected for the operator.

Q. Timer shall automatically flag timing discrepancies (in the user interface, on the results printouts, and in stored memory) greater than .30 seconds between touchpad and backup times.

R. Timer shall have touchpad delay feature with ability to program delays from 1 to 99 seconds.

S. The user interface software shall permit operation of essential functions including Lane Off/On, Finish Arm, Split Arm, and Print Results directly from the main screen to ensure speed and simplicity of operation during critical race times. The interface shall permit the operator to insert a backup time when required (edit) or to disqualify (DQ), automatically posting it to the scoreboard, and provide automatic re-ranking of results. Any corrections generated by the operation (edit or DQ) shall be clearly identified on the results printouts.

T. The user interface shall permit the operator to correct for an erroneous touch by adding/subtracting a touchpad hit to correct the lengths completed. The interface shall not permit the operator to finish a race in any lane; timers including such a function are unacceptable because they permit the possibility of cheating.

U. Timer shall include electronic beeper and LED signaling to indicate touchpad, backup button, and relay judging inputs. Timers which do not allow the user to configure (enable/disable) this feature are unacceptable.

V. Timer connectivity shall include:

1. USB (Type A) port for external storage.

2. USB (Type B) port for meet management connectivity.
3. USB (Type B) port for user interface computer connectivity.
4. Ethernet port for network connectivity
5. Wi-Fi (as available option) for wireless network connectivity
6. Three (3) independent scoreboard output ports
7. For serial wiring systems, connection for in-deck wiring and two connections for on-deck (near and far end) wiring.
8. Serial in-deck can accommodate up to 32 lanes near and far end, on-deck can accommodate up to 20 lanes near and far end.
9. Start system connection directly to timer.
10. External DC power port.

W. Timer shall be capable of updating internal software/firmware via Internet connection.

X. Timer software shall have the ability to adjust the intensity of LED scoreboard brightness.

Y. When recalled from memory, race distance and descriptions are automatically selected for the operator.

Z. Printouts shall be on a parallel printer connected to the rear panel of the timer. Printout of race results shall be switch selectable in "Lane" or "Place" order, or both. A single keystroke shall print touchpad and backup button times. printout shall include race number, event/heat number, event description to facilitate meets, and time & date stamp for each race. The system will allow the user to select any of 8 different data to be printed. Printout of relay judging to include both "plus" and "minus" takeoff times for each leg of the relay.

2.06 GEN7 PACE CLOCK PROGRAM (3)

A. Accessory software program shall turn multi-sport computer and multi-sport scoreboard into an effective training system and coaching tool.

B. Interface to HYTEK's "Workout Manager" software with direct download to computer timer.

C. Programmable workouts are saved into memory for up to 80 workouts.

D. Workouts display on multi-line scoreboard by lane.

E. START/STOP all lanes with one keystroke, or individually.

F. Include programmable "fudge factor" for coaches' election.

2.07 AQUAGRIP TOUCHPADS (TP-78G) (22)

A. Touchpads shall be 78 inches wide x 22 inches tall x .3 inches thick.

B. Touchpads shall be integrated to the timing system using in-deck wiring to a wall plate connection.

C. Touchpads shall be constructed of an all-plastic exterior with only the electrical connector metal exposed. Stainless steel will not be acceptable in pool environment.

D. Touchpads shall have a uniform fine grit, non-abrasive surface that prevents swimmer slippage in any direction.

E. Touchpad markings shall have contrasting colors with a 2" black border and black end-wall cross pattern for portion covered by touchpads.

F. Touchpad brackets shall be custom made to fit the pool gutter system. Diagram required upon placement of order. Provide (22) brackets (4000-0040)

G. Touchpad caddy for storing touchpads supplied shall be (3) CAD-TP/P.

H. TP-GEN7-8 includes (1) 8-lane harness, (7) push buttons, (1) touchpad vacuum pump and (1) touchpad test meter.

I. Provide (6) additional PB-6 push buttons for backup timing.

2.08 SCOREBOARD SYSTEM - INDOOR LED VIDEO DISPLAY (8MM) INDOOR, FULL COLOR) AND TWO (2) RECORD BOARDS

A. Display shall include: full color LED scoreboard with computer controller, mounting hardware and data/fiber cable up to 500'. Display shall be comprised of red, blue, and green LEDs to form pixels. Display shall be capable of 281 trillion shades of color. Full matrix full color LED scoreboard with a computer controller with the Display Link plus software.

1. Display shall be wired to a competitor staging area located remote to the Natatorium with a monitor to show the scoreboard and an additional monitor to receive a video display from a camera(s) located in the Natatorium.

B. Display should be capable of 16-bit video processing, four levels of dimming capability, and allow for Gamma correction. Display brightness shall be adjustable up to 3000 nits.

C. The display shall have built in graphics and animation capability with Windows based software. Graphics and animation shall have the capacity of being displayed on the entire matrix. All MS Windows fonts shall be compatible with the display.

D. Display will allow for front service access.

E. Each pixel shall be comprised of 3 LEDS, 1R1PG1B SMD.

F. Display shall be full color and have 8mm pixel spacing center to center. Record boards shall be full color and have 4mm spacing and can be used in place of the scoreboard

G. Colorado Time Systems display boards are only video display compatible with SYS6 TIMER.

H. Displays swimming, diving, water polo, pace clock, and synchronized swimming functions, competitor's names, full matrix graphics and animation.

I. Live video, and has advertising capabilities.

J. Main Board Total dimensions: @12’-5” high X @48' wide and Record boards 12.07’ tall X 6.82’ wide.

K. All boards Indoor, full color, live video capable.

L. Display shall include 3% critical spare parts.

M. UL/CUL Certified Components.

N. Detailed drawings and weight to be provided with submittals.

O. Operating temperature shall be -10ºC - 40ºC (14ºF - 105ºF).

P. Humidity tolerance shall be 0% - 95%.

Q. Operating temperature shall be -10ºC - 50ºC (14ºF - 120ºF).

R. Humidity tolerance shall be 0% - 95%.

2.09 SOFTWARE TO CONTROL MATRIX/VIDEO DISPLAY

A. Operates full or single color LED matrix displays.

B. Receives data from Colorado Time Systems sports timers.

C. Receives data from 3rd party Meet Management software.

D. Displays standard graphics formats (JPG, GIF, BMP, PNG).

E. Playback of standard digital video (AVI, MPG, WMV).

F. Allows creation of custom data templates with sport-specific information.

G. Creates and plays sequences of templates and graphics, with transition effects.

H. Stores Name and Team information for up to 12 lanes for an infinite number of events and heats.

I. Stores multiple diving event orders, with name and team information.

J. Supports any Windows font as well as custom CTS bitmap (pixel-mapped) fonts.

K. Graphics and templates can be used to provide in-venue advertising.

L. Multiple options for displaying Team Scores and Full Event Results (standalone or in conjunction with Meet Management Software).

M. Quick message feature allows user-driven dynamic messaging.

N. Provides user ability to schedule automatic display of templates and graphics, with recurrences.

O. Runs on Windows Vista or Windows 7 and greater.

P. Simple push button and jog dial interface for switching between video inputs and display modes. High speed switching between modes means no blank screen on LED display while moving between video inputs.

Q. Picture in Picture (PIP) is standard with the Vx4 and allows on the fly adjustments to window sizes and locations at the touch of a button.

R. Handles HDMI (with HDCP support), DVI, DisplayPort, Composite and VGA.

S. Auto scaling of video input to perfectly match the size of the display without any manual adjustments.

T. Allows creation of custom presets which gives the user the ability to have various video sources as well as PiP configurations pre-saved and switch between them at the touch of a button and any video source to be foreground of background to any other video source allowing overlay of scoring data from DisplayLink Plus.

PART 3 EXECUTION:

3.01 EXISTING CONDITIONS

A. Verify that all work by others, related to this section, is installed.

B. Contractor to carefully examine all the construction documents that affect the work of this section.

C. Sub-Contractor and or Manufacturer, prior to starting work, must notify the Architect and General Contractor of any defects requiring correction.

D. Contractor to protect other materials and installed work against damage while completing work in this section.

E. Architect to confirm scoreboard mounting details meet all applicable codes and design standards.

F. Manufacturer shall provide a layout showing all scoreboard components and or wiring conduits, power and boxes needed to meet the intent of the information as stated herein.

3.02 INSTALLATION

A. Furnish and install all custom cables, connecters, scoreboard mounting brackets, and fasteners. Contractor will provide lift and (2) laborers for mounting scoreboard and

pulling cables. Furnish and install equipment in accordance with the manufacturers drawings and instructions.

B. Provide required deck boxes, plates, junction boxes, power and conduit for timing system power and data cable to all locations. Electrical contractor shall provide all required system conduits verified by timing supplier at time of bidding, data conduit, display/construction permits, lift and installation services during the installation of the board

C. Seal all deck plates to the deck with 100% silicone sealant so no water can enter the deck box.

3.03 SERVICES

A. Operator Training – the successful bidder shall provide a factory representative to conduct a personalized on-site training seminars designed to cover all areas of operator and maintenance training on the equipment. Initial seminar shall be for at least 4 hours.

B. Warranty shall be provided with a full on-site service plan, including parts and labor, for the first year of equipment installation. Additionally, the facility shall be provided with a service plan for one additional year covering each component of the timing/display system.

End of Section 13 15 60

SECTION 23 31 16 - NONMETAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Fabric ductwork.
   2. Thermoset FRP ducts.

B. Related Sections include the following:
   1. Division 23 Section "Air Duct Accessories" for dampers, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 DEFINITIONS

A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula Btu x in./h x sq. ft. x deg F at temperature differences specified. Values are expressed as Btu.
   1. Example: Apparent Thermal Conductivity (k-Value): 0.26.

1.4 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Fabric ductwork.
   2. Thermoset FRP duct materials.

B. Shop Drawings: Drawn to 1/4 inch equals 1 foot scale. Show fabrication and installation details for nonmetal ducts.
   1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   2. Duct layout indicating sizes and pressure classes.
   3. Elevations of top and bottom of ducts.
   4. Dimensions of main duct runs from building grid lines.
   5. Fittings.
   6. Reinforcements and spacing.
   7. Seam and joint construction.
   8. Penetrations through fire-rated and other partitions.
   9. Equipment installation based on equipment being used on Project.
   10. Duct accessories, including access doors and panels.
   11. Hangers and supports, including methods for duct and building attachment, vibration isolation, and seismic restraints.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Ceiling suspension assembly members.

2. Other systems installed in same space as ducts.
3. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.
4. Ceiling-mounting items, including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.6 QUALITY ASSURANCE

A. NFPA Compliance:
1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. UL Compliance: UL listed and labeled as complying with UL 181, Class 1; ASTM E 84, Class I; ASTM E 84, Class II; and ASTM E 84, Class III.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FABRIC DUCTWORK

A. Manufacturers:
1. Ductsox.
2. Fabric Air, Inc.
3. KE Fibertec

B. FABRIC AIR DISPERSION SYSTEM (FOR AREAS WITH HIGH MOISTURE)
1. Sedona-Xm Fabric: Air diffusers shall be constructed of a woven fire retardant fabric complying with the following physical characteristics:
a. Fabric Construction: 100 percent flame retardant and treated with a machine washable anti-microbial agent from the manufacturer.
b. Weight: 6.8 oz./sq.yd. per ASTM D3776.
c. Standard color as selected by A/E.
d. Fabric Porosity: 2 (+2/-1) cfm/sq.ft. per ASTM D737, Frazier.
e. Temperature Range: 0 degrees F to 180 degrees F.
f. Fire Retardancy: Classified by UL in accordance with the flame spread/smoke developed requirements of NFPA 90-A and ICC AC167.
g. Antimicrobial agent shall be proven 99 percent effective after 10 laundry cycles per AATCC Test Method 100.
2. Systems Fabrication Requirements
a. Air dispersion accomplished by linear vent and permeable fabric. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.
b. Size of vent openings and location of linear vents to be specified and approved by manufacturer.
c. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via zip screw fastener – supplied by contractor.
d. Inlet connection includes zipper for easy removal/maintenance.
e. Lengths to include required zippers as specified by manufacturer.

f. System to include adjustable flow devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.
g. End cap includes zipper for easy maintenance.
h. Fabric system shall include connectors to accommodate suspension system listed below.
i. Any deviation from a straight run shall be made using a gored elbow or an efficiency tee. Normal 90 degree elbows are 5 gores and the radius of the elbow is 1.5 times the diameter of the fabric duct.

3. Design Parameters
   a. Use fabric diffusers only for positive pressure air distribution components of the mechanical ventilation system.
   b. Do not use fabric diffusers in concealed locations.
   c. Fabric diffusers shall be designed from 0.25 inch water gage minimum to 3.0 inch maximum, with 0.5 inch as the standard.
   d. Fabric air diffusers shall be limited to design temperature between 0 degrees F and 180 degrees F.
   e. Design CFM, static pressure and diffuser length shall be designed or approved by the manufacturer.
4. Suspension Hardware
   a. Suspended H-Track: System shall include a double (2 row) runs of aluminum H-track system located 1.5 inch above the 10 and 2 o'clock (2 row) locations of fabric duct system. 2 row supports are required for systems of 32 inch diameter and larger. Hardware to include 10 foot sections of track, splice connectors, track endcaps and vertical cable support kits – consisting of a length of cable with a locking stud end and gripple quick cable connectors. Radius aluminum track must be included for all radius sections.
      1) Fabric/Track Attachment
         a) Snap tabs are a detachable sliding tab positioned every 24 inches along the length of the system (all diameters).
      2) Hardware Components
         a) Provide 316 stainless steel components including coupler assembly, vertical cable support and gripple quick cable connector.

2.3 THERMOSET FRP DUCTS

A. Manufacturers:
   1. McGill AirFlow Corporation.
   2. Spunstrand Inc.

B. Glass-fiber-reinforced plastic with a minimum of 3/16-inch wall thickness.

C. Fabrication:
   1. Maximum Operating Static Pressure: 10-inch wg.
   2. Straight, Rectangular-Duct Seams: Glass tape and resin reinforced.
   3. Round Ducts: Molded on mandrel with continuous wound glass filaments.
   4. Section and Fitting Connectors: Sleeves or belled ends, and epoxy.

D. Fitting Fabrication:
   1. Round Elbows: Five-piece, mitered construction with centerline radius at least two times the diameter.
   2. Rectangular Elbows: Mitered with turning vanes.
   3. Branch Connections to Main Ducts: 45 degrees from centerlines of main ducts.
   4. Reducers, Round-to-Rectangular Transformations: Minimum taper of 3:1 length change to diameter.
   5. Offsets: 45 degrees from centerlines of straight ducts.

E. Flange Fabrication:
   1. Adhered to ducts with epoxy.
   2. Fabricated from 1/4-inch thick FRP at least 2 inches wide.
   3. Gaskets: Full face, 1/8 inch thick.

4. Flange Bolts, Nuts, and Washers: 9/32 inch in diameter; Type 316, stainless steel.

F. Supports and Hangers: Galvanized steel.
1. Vertical Ducts: Structural channels and clamps under 1/2-inch flanges adhered with epoxy to outside of ducts.
2. Horizontal Ducts: Steel split rings and rod hangers.

G. Drains: Formed drain pockets with 1-inch threaded pipe connections.

H. Flexible Connectors:
1. Material: Hypalon.
2. Length: 4 inches between both parts to be connected, with enough slack material to prevent vibration transmission when system is in operation.
3. Clamps: Two stainless-steel, gear-drive bands.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of Fabric Air Dispersion System
1. Install selected suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product.

B. Install ducts with fewest possible joints.

C. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

D. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

E. Install ducts with a clearance of 1 inch.

F. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

G. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts with sheet metal flanges of same metal thickness as ducts. Overlap opening on 4 sides by at least 1-1/2 inches.

H. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section "Air Duct Accessories." Firestopping materials and installation methods are specified in Division 07 Section "Penetration Firestopping."

I. Install thermoset FRP ducts and fittings according to NFPA 91.

J. Install thermoset FRP ducts so that no metals penetrate duct system.
1. Support vertical ducts at every floor and at roof. Support horizontal ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
2. Support exhaust fans, fume hoods, and heavy accessories independent of ducts.
3. Install flexible connectors with enough slack to prevent vibration transmission when fan is in operation.
4. Install and brace rainstack exhaust terminals with stays firmly anchored to roof.
5. Slope exhaust ducts back to fume hoods.
6. Install penetrations through roof with flashing and counterflashing.

K. Mount accessories according to NAIMA AH116; SMACNA's "Fibrous Glass Duct Construction Standards"; SMACNA's "Thermoplastic Duct (PVC) Construction Manual"; and SMACNA's "Thermoset FRP Duct Construction Manual."
   1. Reinforce and support equipment and duct accessories for additional weight without damage to ducts.
   2. Install volume-control dampers and operators on same sleeves or mounting plates and allow full 90-degree quadrant movement.
   3. Connect ducts to equipment using sheet metal washers and screws or mechanical fasteners attached to flange extensions.

L. Assemble thermoset FRP ducts according to SMACNA's "Thermoset FRP Duct Construction Manual."
   1. Fabricate mitered elbows with turning vanes.
   2. Fabricate 90-degree branch connections from supply ducts with volume-control dampers in branch ducts.
   3. Install reinforcements according to SMACNA's "Thermoset FRP Duct Construction Manual."
   4. Support rigid round and rectangular ducts according to SMACNA's "Thermoset FRP Duct Construction Manual."

M. Duct Attachments: Support horizontal ducts with trapeze-type hangers.

N. Hangers: Suspend duct attachments from building attachments with one of the following hanger types:
   1. Galvanized sheet metal strips, a minimum of 0.034 by 1 inch wide.
   2. Galvanized-steel rods, 1/4 inch in diameter, threaded along entire length.
   3. Galvanized-steel wire, 0.108 inch minimum.

O. Attach hangers to joints and reinforcing channels that occur within required hanger spacing. Attach hangers to transmit load to sides and bottom channels and no more than 6 inches from sides of ducts.

P. Support equipment and metal duct components and accessories independent of ducts.

Q. Support terminal components separately.

R. Install sheet metal sleeves to support dampers. For motorized dampers, extend sleeves to support operators.

3.2 FIELD QUALITY CONTROL

A. Inspect fibrous-glass duct systems according to "Inspection Checklist for Fibrous Glass Duct System Installation" in NAIMA AH116. Prepare a written report using the format of this checklist.

3.3 CLEANING

A. Clean air handling unit and ductwork prior to fabric system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.

B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation if completed.

C. If fabric duct systems become solid during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

D. Clean ducts according to NAIMA AH122.

END OF SECTION 23 31 16

SECTION 23 73 13 - MODULAR INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Refer to Division 23 Section “Common Motor Requirements for HVAC Equipment”.

1.2 SUMMARY

A. Section Includes:
   1. Constant-air-volume, single-zone air-handling units.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Casing panels shall be self-supporting and capable of withstanding 133 percent of internal static pressures indicated, without panel joints exceeding a deflection of L/240 where "L" is the unsupported span length within completed casings.

1.4 ACTION SUBMITTALS

A. Product Data: For each air-handling unit indicated.
   1. Unit dimensions and weight.
   2. Cabinet material, metal thickness, finishes, insulation, and accessories.
   3. Fans:
      a. Certified fan-performance curves with system operating conditions indicated.
      b. Certified fan-sound power ratings.
      c. Fan construction and accessories.
      d. Motor ratings, electrical characteristics, and motor accessories.
   4. Certified coil-performance ratings with system operating conditions indicated.
   5. Dampers, including housings, linkages, and operators.
   6. Filters with performance characteristics.

B. Coordination Drawings: Floor plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Mechanical-room layout and relationships between components and adjacent structural and mechanical elements.
   2. Support location, type, and weight.
   3. Field measurements.

1.5 CLOSEOUT DOCUMENTS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Operation and Maintenance Data: For air-handling units to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

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 air-handling units and components.

C. ARI Certification: Air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.

D. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate coil pull and maintenance requirements with equipment provided.

C. Coordinate sizes and locations of structural-steel support members, if any, with actual equipment provided.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Filters: One set(s) for each air-handling unit.
   2. Fan Belts: One set(s) for each air-handling unit fan.

1.9 RELATED WORK BY OTHERS

A. Supply and exhaust fans shall be controlled by variable frequency controllers (VFC). VFC shall be specified in Section 23 29 23. Division 26 shall wire to the VFC complete with disconnect from remote mounted VFC to the fan motor.

B. The energy recovery motor shall be controlled by a variable frequency controller (VFC). VFC shall be specified in Section 23 29 23. Division 26 shall wire to the VFC complete with disconnect from remote mounted VFC to the motor.

C. Division 26 Contractor shall provide 115/1/60 single point power connection to junction box(es) factory installed by unit manufacturer for convenience lighting and receptacles.

D. Temperature Control Contractor shall provide interconnecting wiring required for proper wire control.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Carrier Corporation; a member of the United Technologies Corporation Family.
   2. Daikin
   3. Trane; American Standard Inc.
   4. Johnson Controls

2.2 UNIT CASINGS

A. General Fabrication Requirements for Casings:
   1. Forming: Form walls, roofs, and floors with at least two breaks at each joint.
   2. Casing Joints: Sheet metal screws.
   3. Sealing: Seal all joints with water-resistant sealant.
   4. Factory Finish for Galvanized-Steel Casings: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on enamel finish, consisting of prime coat and thermosetting topcoat.

5. The entire unit shall be double wall construction. The minimum thickness shall be 2 inches thick of 22 gauge solid plate galvanized steel in all interior panel sections. Exterior panels shall be constructed of 18 gauge solid plate galvanized steel.
6. The entire fan section and discharge plenum section shall be 2 inch thick double wall construction, fully insulated, and shall have a 22 gauge perforated galvanized steel plate inner liner.
7. Unit casing shall withstand 6 inches of positive pressure or 4 inches negative static pressure.
8. Leakage rate shall be no move than 1 percent of design airflow at plus/minus 8 inch wg.
9. Panels and access doors deflection shall not exceed L/240 ratio of design static pressure.

B. Casing Insulation and Adhesive:
1. Materials: ASTM C 1071, Type I or Type II.
2. Location and Application: Factory applied with adhesive and mechanical fasteners to the internal surface of section panels downstream from, and including, the cooling-coil section.
   a. Liner Adhesive: Comply with ASTM C 916, Type I.
   b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
   c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service-air velocity. Insulation shall be 2 inch thick, 3 pound per cu.ft. density or foam injection insulation minimum R-value of 12.
   d. Insulation and adhesive shall conform to NFPA.
   e. Unit casing panels shall be 2-inch double wall construction, with solid galvanized exterior and solid galvanized or stainless steel interior, to facilitate cleaning of unit interior.
   f. Unit casing panels and door shall be provided with a minimum thermal resistance (R-value) of 13.
   g. Structural frame must not extend from air-handling unit to interior to exterior. All component and panel support structure must be internal to AHU. Casing panel inner liners must not extend to the exterior fo the unit or contact the exterior frame. A mid-span, no through metal, internal thermal break shall be provided for all unit casing panels.
3. Location and Application: Encased between outside and inside casing.

C. Inspection and Access Panels and Access Doors:
1. Panel and Door Fabrication: Formed and reinforced, double-wall and insulated panels of same materials and thicknesses as casing.
2. Inspection and Access Panels:
   a. Fasteners: Two or more camlock type for panel lift-out operation. Arrangement shall allow panels to be opened against air-pressure differential.
   b. Gasket: Neoprene, applied around entire perimeters of panel frames.
   c. Size: Large enough to allow inspection and maintenance of air-handling unit's internal components.
3. Access Doors:
   a. Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance.
   b. Access doors shall be hinged and removable without the use of specialized tools.
   c. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site conditions.
   d. Gasket: Neoprene, applied around entire perimeters of panel frames.
   e. Size: 60 inches high when sufficient height is available, or the maximum height allowed by the unit.
   f. Multiple door handles shall be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit.

g. The hinge shall provide a method of releasing cabinet operating pressure while maintaining a safety catch to the door for fan sections.
h. Size: At least 18 by 60 inches.

4. Locations and Applications:
   a. Fan Section: Doors provided with service window.
   b. Access Section: Doors.
   c. Coil Section: Doors and access panel.
   d. Damper Section: Doors with service window.
   e. Filter Section: Doors large enough to allow periodic removal and installation of filters.
5. Lighting and convenience outlet circuit
   a. Service Light: Provide a minimum of one light fixture in each section accessed with a door. Fixture shall be 120 volt, vaportight with LED. Lumen output shall be equivalen to a 100 watt incandescent lamp.
   b. Provide a minimum of one spring wound light switch and shall be factory mounted on outside of unit. Switch shall be 20 amp rated, weather proof, top hinged cover.
   c. Provide a minimum of one duplex, convenience receptacle, ground fault circuit interrupting type, factory mounted on outside of unit. Receptacle shall be 20 amp, 120 volt, ground, weather proof rated with top hinged cover. Cover shall be designed to allow cord and plug connection with the cover closed.
   d. Lights and receptacles in the entire unit shall be factory wired to one junction box for a single point power connection by Division 26. Division 23 shall be responsible for all wiring required between shipping splits.

D. Condensate Drain Pans:
1. Fabricated with slopes in at least 2 planes to collect condensate from cooling coils (including coil piping connections, coil headers and return bends, and a minimum of 6 inches downstream from cooling-coil face) and from humidifiers.
2. Double-wall, stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
3. A minimum of 2 inches deep, and complying with requirements in ASHRAE 62.1.
4. Drain Connections: Drain connection located as denoted on Drawings.
5. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

E. Air-Handling-Unit Mounting Frame: Formed galvanized-steel channel or structural channel supports, designed for low deflection, welded with integral lifting lugs.
1. Seismic Fabrication Requirements: Fabricate mounting base and attachment to air-handling unit sections, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" when air-handling unit frame is anchored to building structure.

2.3 ACCESS DOORS AND PANELS

A. Access doors or plug panel doors will be provided as indicated on the drawings. Doors shall be rigid double wall construction and shall use heavy-duty hinges with lockable latches on each door. Doors shall be a minimum of 15 inch in width. Doors shall be of the same construction as panels. Door latches shall be capable of being fully tightened against gasket surfaces. All major components such as coils, filters, blowers, etc., within the air handling structure shall be easily removable through access panels without dismantling plenums or distributing ductwork. Equipment that requires disassembly of components rather than access through removable or hinged panels shall not be acceptable. The unit casing shall include access panels for inspection and for any maintenance required by the operating and maintenance manual. Panels without gaskets shall not be acceptable.

2.4 LIGHTING AND CONVENIENCE OUTLET CIRCUIT

A. Vapor-proof service lights shall be provided in all sections requiring access for the use of service personnel.

1. Lights and receptacles shall be factory wired to junction box.
2. 115/1/60 power shall be field wired to the junction box so that the lights and receptacles remain operable when the main service disconnect has been opened to allow unit internal access.

B. Lighting fixtures selected shall be vapor-proof.
1. Light fixture operation shall not be affected by moisture.
2. Construction shall consist of shockproof threaded gasketed bodies, clear glass threaded globe.

C. A convenience outlet shall be mounted on exterior of unit and shall be a combination switch and outlet, UL listed rated for outdoors.

2.5 FAN, DRIVE, AND MOTOR SECTION

A. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.
1. Shafts: Designed for continuous operation at maximum-rated fan speed and motor horsepower, and with field-adjustable alignment.
a. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
b. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

B. Centrifugal Fan Housings: Formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell.
1. Bracing: Steel angle or channel supports for mounting and supporting fan scroll, wheel, motor, and accessories.
2. Horizontal-Flanged, Split Housing: Bolted construction.
3. Housing for Supply Fan: Attach housing to fan-section casing with metal-edged flexible duct connector.
4. Flexible Connector: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch wide, 0.028-inch thick, galvanized-steel sheet or 0.032-inch thick aluminum sheets; select metal compatible with casing.
a. Flexible Connector Fabric: Glass fabric, double coated with neoprene. Fabrics, coatings, and adhesives shall comply with UL 181, Class 1.
1) Fabric Minimum Weight: 26 oz./sq. yd.
2) Fabric Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3) Fabric Service Temperature: Minus 40 to plus 200 deg F.

C. Plug Fans Housings: Steel cabinet; fabricated without fan scroll and volute housing.

D. Backward-Inclined, Centrifugal Fan Wheels: Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

E. Forward-Curved, Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

F. Airfoil, Centrifugal Fan Wheels: Smooth-curved inlet flange, backplate, and hollow die-formed airfoil-shaped blades continuously welded at tip flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

G. Axial Fans: Fan wheel and housing, straightening-vane section, factory-mounted motor with belt drive or direct drive, an inlet cone section, and accessories.
1. Variable-Pitch Fans: Internally mounted electronic actuator, externally mounted positive positioner, and mechanical-blade-pitch indicator.

2. Housings: Galvanized steel.
   a. Inlet and Outlet Connections: Flanges.
   b. Guide Vane Section: Integral guide vanes downstream from fan wheel designed to straighten airflow.

H. Fan Shaft Bearings:
1. Grease-Lubricated Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing with grease lines extended to outside unit and a rated life of 120,000 hours according to ABMA II.

I. Belt Drives: Factory mounted, with adjustable alignment and belt tensioning, and with 1.5 service factor based on fan motor.
1. Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
2. Motor Pulleys: Adjustable pitch for use with 5-hp motors and smaller; fixed pitch for use with motors larger than 5 hp. Select pulley size so pitch adjustment is at the middle of adjustment range at fan design conditions.
3. Belts: Oil resistant, nonsparking, and nonstatic; in matched sets for multiple-belt drives.
4. Belt Guards: Comply with requirements specified by OSHA and fabricate according to SMACNA's "HVAC Duct Construction Standards"; 0.1046-inch thick, 3/4-inch diamond-mesh wire screen, welded to steel angle frame; prime coated.

J. Fan Motors
1. Motors shall be heavy duty, open drip-proof, premium efficiency type or totally enclosed fan cooled type. Motors designated using a variable frequency drive (where denoted on the drawings or schedules) shall be inverter-duty type, meeting the requirements of NEMA MG1 Part 31. Motors shall be mounted to the fan assembly. Belt drive fan motors shall have an adjustable base to permit drive belt tensioning.
2. Motors shall be standard NEMA frame.
3. Motors for direct drive fans shall be suited for direct drive applications, with motor speed matched to the fan wheel RPM.
4. All motors driven by a variable frequency controller shall include a maintenance free, circumferential, conductive microfiber shaft grounding ring (AEGIS-SGR) to discharge shaft currents to ground.

K. Internal Vibration Isolation: Fans shall be factory mounted with manufacturer's standard restrained vibration isolation mounting devices having a minimum static deflection of 1 inch.
1. Enclosure Type: Totally enclosed, fan cooled.
2. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
3. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.
4. Mount unit-mounted disconnect switches on exterior of unit.

2.6 COIL SECTION

A. General Requirements for Coil Section:
1. Comply with ARI 410.
2. Fabricate coil section to allow removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s).
3. Coils shall not act as structural component of unit.

B. Heating and Chilled Water Coils
1. Aluminum fin and seamless copper tube in steel casing.
2. Minimum tube wall thickness of 0.020 inches.
3. Headers, coil, and coil return bends shall be enclosed inside unit.
4. Test complete coil assembly at 300 psi air under water.
5. Provide 5/8” tube diameter.

2.7 AIR FILTRATION SECTION

A. General Requirements for Air Filtration Section:
   1. Comply with NFPA 90A.
   2. Provide minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
   3. Provide filter holding frames arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

B. Disposable Panel Filters:
   1. Factory-fabricated, viscous-coated, flat-panel type.
   2. Thickness: 2 inches.
   3. Arrestance (ASHRAE 52.1): 80.
   4. Merv (ASHRAE 52.2): 8.
   5. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
   6. Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.

C. Extended-Surface, Disposable Panel Filters:
   1. Factory-fabricated, dry, extended-surface type.
   2. Thickness: 12 inches.
   3. Arrestance (ASHRAE 52.1): 90.
   4. Merv (ASHRAE 52.2): 13.
   5. Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.
   6. Media-Grid Frame: Galvanized steel.
   7. Mounting Frames: Welded, galvanized steel, with gaskets and fasteners, suitable for bolting together into built-up filter banks.

2.8 DAMPERS

A. Leakage rate, according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating," shall not exceed 2 percent of air quantity at 2000-fpm face velocity through damper and 4-inch wg pressure differential.

B. Damper Operators: Comply with requirements in Division 23 Section "Instrumentation and Control for HVAC."

C. Face-and-Bypass Dampers: Opposed-blade, galvanized-steel or aluminum dampers withsteel operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel or aluminum frame and with operating rods connected with a common linkage. Provide blade gaskets and edge seals, and mechanically fasten blades to operating rod.

D. Outdoor- and Return-Air Dampers: Low-leakage, double-skin, airfoil-blade, galvanized-steel or aluminum dampers with compressible jamb seals and extruded-vinyl blade edge seals in parallel-blade arrangement withsteel operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel or aluminum frame, and with operating rods connected with a common linkage. Leakage rate shall not exceed 5 cfm/sq. ft. at 1-inch wg and 9 cfm/sq. ft. at 4-inch wg.

E. Mixing Section: Multiple-blade, air-mixer assembly located immediately downstream of mixing section.

F. Combination Filter and Mixing Section:
   1. Cabinet support members shall hold 2-inch thick, pleated, flat, permanent or throwaway filters.
   2. Multiple-blade, air-mixer assembly shall mix air to prevent stratification, located immediately downstream of mixing box.

2.9 AIR-TO-AIR ENERGY RECOVERY

A. Total energy recovery wheel shall be provided as indicated on the schedule and drawings. Wheels shall be integral parts of the air handling unit and shall be sized per the requirements.

B. The air handling unit shall be certified by AHRI to contain a rotary energy recovery wheel certified to ANSI/AHRI Standard 1060. The energy recovery cassette shall be an Underwriters Laboratories (UL) recognized component certified for mechanical, electrical and fire safety in accordance to UL Standard 1812.

C. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and belts. The total energy recovery wheel shall incorporate a desiccant without the use of binders or adhesives. The absorbent shall not be applied as a glued on surface coating and not susceptible to erosion, abrasion or delamination. The rim shall be continuous stainless steel to form an even concentric circle to prevent leakage around the rim to minimize wear of components. All diameter and perimeter seals shall be provided as part of the cassette assembly. Perimeter seals shall be self-adjusting, diameter seals shall be adjustable.

D. Wheel drive motor shall be provided mounted in the cassette frame. Wheel drive motor shall be thermally protected and UL component recognized. Drive belts shall not require belt tensioner.

E. Wheel bearings shall be permanently sealed and lubricated and have a minimum L-10 life of 400,000 hours.

F. Access doors shall be provided for the removal of wheel segments. Doors shall be located to allow access to the entire upstream and downstream face of the wheel. Adequate space and access shall be provided for energy recovery whell motor, bearing and belt removal.

G. Casing:
1. Steel, with manufacturer's standard paint coating.
2. Integral purge section limiting carryover of exhaust air to between 0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg differential pressure.
3. Casing seals on periphery of rotor, on duct divider, and on purge section.
4. Support rotor on grease-lubricated ball bearings with extended grease fittings. Mount horizontal wheels on tapered roller bearing.

H. Rotor: Aluminum, segmented wheel, strengthened with radial spokes, with nontoxic, noncorrosive, silica-gel desiccant coating.

I. Rotor: Aluminum, glass-fiber, or polymer segmented wheel, strengthened with radial spokes impregnated with nonmigrating, water-selective, molecular-sieve desiccant coating.

J. Drive: Fractional horsepower motor and gear reducer, with speed changed by variable frequency controller, and self-adjusting multilink belt around outside of rotor.

K. All motors driven by a variable frequency controller shall include a maintenance free, circumferential, conductive microfiber shaft grounding ring (AEGIS-SGR) to discharge shaft currents to ground.

2.10 CONTROL PANEL AND POWER DISCONNECTS

A. Temperature control devices shall be supplied, mounted, and wired by Temperature Control Contractor unless otherwise herein specified.

B. The unit shall be equipped with the following disconnects:
1. Local disconnect at each fan motor inside unit for protection of service personnel.
2. Motors designated for VAV operation shall include a factory mounted disconnect with one set of auxiliary contacts.

3. A single toggle switch to operate service lights routed with conduit to each junction box and suitable for field wiring between boxes by Division 26.

C. Wiring and conduit sizing shall be in accordance with the National Electrical Code.
1. Wiring shall have insulation rated at 600 volts.
2. Control wiring shall be color coded or tagged.
3. Wiring in the air handling units shall be in solid wall conduit with a maximum of 3 foot long runs of flexible conduit to motors and other vibrating components.

2.11 FIELD WIRING PROVISIONS

A. Lugs for connection of 115/1/60 service to convenience outlets/lights.

B. Lugs for connection of power as denoted on plans.

2.12 SOURCE QUALITY CONTROL

A. Fan Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Fans shall bear AMCA-certified sound ratings seal.

B. Fan Performance Rating: Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency. Rate performance according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating."

C. Water Coils: Factory tested to 300 psig according to ARI 410 and ASHRAE 33.

D. Steam Coils: Factory tested to 300 psig and to 200 psig underwater according to ARI 410 and ASHRAE 33.

E. Refrigerant Coils: Factory tested to 450 psig according to ARI 410 and ASHRAE 33.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine casing insulation materials and filter media before air-handling unit installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

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

3.2 INSTALLATION

A. Equipment Mounting: Install air-handling units on concrete bases. Secure units to anchor bolts installed in concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-Place Concrete." Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
2. Install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Arrange installation of units to provide access space around air-handling units for service and maintenance.

C. Unit manufacturer shall provide a factory-trained technician to supervise the original start up of the unit for final operation.

D. Large units that have to be shipped in sections and are not fully assembled shall be field assembled with full perimeter gaskets and sealant material provided between each section. Contractor shall inspect each joint to insure that each section is drawn tight and sealed eliminating any air leakage.

E. Units shall be shipped in splits to fit through the existing building doorways and openings.

F. The Contractor shall provide labor to accomplish check-test-start procedure as recommended by the unit manufacturer.

G. The Contractor shall provide branch line shutoff valves, balancing valves, temperature control valves, vents, strainers, gauges, coil circulator pumps, and other such related items as required for a complete system and as denoted on the drawings.

H. Provide 6-inch high concrete housekeeping pad under each air handling unit or as denoted on the drawings.

I. The Contractor shall grease and lubricate all fan and motor bearings prior to start-up of the fan system.

J. Clean inside and outside of each air handling unit prior to Substantial Completion including all coils and dampers.

K. Touch up locations where paint or factory finish has been damaged during construction.

L. Arrange all piping to each air handling unit coil such that the coil can be easily removed for service or replacement.

M. Connect factory wiring between each air handling unit section for units that were shipped in sections.

N. Units that have openings in the floor shall have labels affixed to the exterior access door indicating “Caution Fall Hazard Within”. In addition, each floor opening shall have a metal bars or large free area open grate over opening. Metal grate shall not be of a design as to restrict the air flow in the ductwork.

O. Remove shipping blocks from under inertia pads prior to pouring concrete. Provide all necessary concrete for units that have been furnished with inertia pads.

P. Coordinate with the Temperature Control Contractor in locating all control devices within the air handling unit. All wiring shall be neatly run on inside and outside of each unit.

Q. Balancing Contractor shall attach equipment data card that indicates the final balanced condition of the air, water and electrical characteristics of each unit.

R. Provide condensate drain trap for each air handling unit as detailed on the drawings for either a draw-thru or blow-thru configuration as applicable. Terminate the condensate drain into the nearest floor drain. Provide a funnel for each floor drain receiving condensate as shown on the plumbing drawings. Make final adjustments to each condensate trap as needed. All condensate drain pans within each air handling unit shall not have any standing water.

S. Insulate all horizontal sanitary waste piping from floor drains that receive cooling coil condensate from air handling units located on mechanical mezzanines.

T. Remove construction filters, and install full set of pre-filters and primary filters in each air handling unit. Deliver all spare sets of filters to location as designated by the Owner.

3.3 CONNECTIONS

A. Comply with requirements for piping specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to air-handling unit to allow service and maintenance.

C. Connect piping to air-handling units mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using, ASTM B 88, Type M copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

E. Hot- and Chilled-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping." Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.

F. Connect duct to air-handling units with flexible connections. Comply with requirements in Division 23 Section "Air Duct Accessories."

G. Ground equipment according to Division 26 Section “Grounding and Bonding for Electrical Systems”.

H. Connect wiring according to Division 26 Section “Low-Voltage Electrical Power Conductors and Cables”.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Leak Test: After installation, fill water and steam coils with water, and test coils and connections for leaks.
   2. Charge refrigerant coils with refrigerant and test for leaks.
   3. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to 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 piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
   4. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
   5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
   6. Verify that zone dampers fully open and close for each zone.
   7. Verify that face-and-bypass dampers provide full face flow.
   8. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
   9. Comb coil fins for parallel orientation.
   10. Verify that proper thermal-overload protection is installed for electric coils.
   11. Install new, clean filters.
   12. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

B. Starting procedures for air-handling units include the following:
   1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
   2. Measure and record motor electrical values for voltage and amperage.
   3. Manually operate dampers from fully closed to fully open position and record fan performance.

3.6 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

3.7 CLEANING

A. After startup service, clean air-handling units internally on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face.

B. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems, clean filter housings and install new, clean filters.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-handling units.

END OF SECTION 23 73 13

SECTION 23 73 15 – POOL DEHUMIDIFICATION UNITS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, Sections included under Division 1, General Requirements, and Section 230500 of this Division are included as a part of this Section as though bound herein.

B. Refer to the Details and/or Schedules on the Drawings for additional requirements.

1.02 SUMMARY

A. This Contractor shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

B. This Section of Work includes the furnishing of the natatorium area air handling units as herein specified and as scheduled and/or denoted on the Drawings.

1.03 QUALITY ASSURANCE

A. System shall be required to meet the pounds/hour of dehumidification scheduled on the Drawings.

B. The complete unit shall be listed by Underwriter Laboratories or ETL.

1.04 WARRANTY

A. The Contractor and unit manufacturer shall be responsible for the warranty failures on the units for a period of one year following substantial completion.
   1. Unit manufacturer shall warrant components to be free from defects and failures and shall supply parts required to correct warranty failures.
   2. Mechanical Contractor shall supply labor, cartage, and supplies required to replace failed parts.

B. Extended Refrigeration Warranty
   1. Unit manufacturer shall provide an additional 5 years parts and labor warranty on compressors and all components in the refrigeration system.

C. Extended Heat Exchanger Warranty
   1. Unit manufacturer shall provide an additional 5 years parts and labor for the gas furnace heat exchanger.

1.05 DESIGN PARAMETERS

A. The main pool water temperature will be 80°F. The space should be maintained at 82°F (adjustable), 50% RH. The outside air flow rate into the space shall be as specified on the mechanical equipment schedule.

PART 2 PRODUCTS

2.01 POOL DEHUMIDIFICATION UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. PoolPak
   2. DesertAire
   3. Innovent

B. Provide energy recovery and dehumidification units in accordance with this specification, drawing details and the corresponding temperature/humidity control sequences.

C. Arrangement of all units shall be as shown on the Drawings. Performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, and 100% run tested to check operation, fan and blower rotation and control sequence (if applicable) before leaving the factory.

D. Summary: The pool dehumidification units shall include:

1. Mechanical process dehumidification
2. Indoor cabinet configuration
3. A packaged hot water heating coil, sized as specified by the design engineer to meet the skin losses and outdoor air heating loads
4. Purge and economizer modes
5. Minimum exhaust and purge exhaust fan(s) with economizer mode
6. Heat recovery between the minimum exhaust air and outdoor air streams by means of a glycol run-around loop
7. Heat recovery between the minimum exhaust air and outdoor air streams and via a glycol run around loop
8. Programmable microprocessor controller with remote Internet logging and parameter adjustment
9. Remote operator panel(s)
10. Modbus building management system interface
11. A service vestibule where the compressor, refrigeration specialties, control valves and all electronics are outside of process air stream
12. Outside air measuring elements

E. Cabinet

1. The system shall be designed and configured for indoor installation with a 2" double-walled cabinet including painted inner liner
2. Infill panels and doors shall be constructed with 18 gauge G90 galvanized steel exterior and 18 gauge mil aluminum finish interior suitable for chlorine and pool chemical resistance.
3. The structural base frame shall be 3/16" steel channel base with 12-gauge steel cross bracing.
4. Cabinet Construction: All cabinet 16, 20 and 24 gauge sheet metal shall be galvanized G90 steel or GalvalumeTM alloy with mill-applied zinc phosphate primer followed by an exterior grade white silicone modified polyester top coat. The sheet metal is engineered to form a cabinet with maximum strength and rigidity. All seams shall be caulked with silicone to prevent air and water leakage or infiltration
5. Base Rails: The cabinet shall have a base frame comprised of 2 layers of 10 gauge mill galvanized G90 steel. Lifting lugs shall be provided on the base frame for rigging the system
6. The cabinet walls shall be of double-wall construction using 20 gauge pre-painted steel with a fully painted inner metal liner and 2 inches of fiberglass insulation
7. The cabinet floor shall be comprised of a 16-gauge galvanized steel panel with a 20-gauge pre-painted steel inner liner, 2-inch double wall engineered with structural bending for maximum rigidity and be mechanically fastened to the base frame of the unit
8. The cabinet roof shall be 20-gauge pre-painted steel, 2-inch double wall engineered with structural bending for maximum rigidity and be mechanically fastened to the base walls of the unit
9. The cabinets shall be mechanically assembled with stainless steel sealed blind rivets. Where bolts are required bright zinc plated bolts shall be used.
10. Access doors shall be supported on multiple hinges, held shut by compression latches for quick access. Doors shall be provided for entrance to all sections housing components requiring routine maintenance. Full height access doors shall have "hold back" latches to prevent door closure during the performance of service procedures

11. Access doors shall be mounted on multiple combination hinge/latch mechanisms which swing either direction 180 degrees and lifts off. Doors shall be provided for entrance to all sections housing components requiring routine maintenance. Doors shall be secured with minimum two tool-operated latches and sealed against the frame with rubber gasket material.
12. The system shall have non-corroding protective mesh screens covering internal fan blades, protective grates covering all floor access ports

F. Outdoor Air Intake:

1. Purge /Economizer and Minimum Outdoor Air connections with motorized dampers and controls.

2. Minimum outdoor air intake with airflow sensing elements.

G. Insulation: The unit shall be insulated per the following standards:

1. All exterior cabinet sections shall be insulated with two (2) inch thick fiberglass inside the double walled cabinet

2. Fire resistant rating to conform to NFPA Standard 90A and 90B

3. Sound attenuation coefficient shall not be less than 1.02 at a frequency of 1,000 Hz as per ASTM Standard C423

4. Thermal conductivity shall not exceed 0.26 Btu/hr-sqft-ft at 75 ℉

H. Cabinet configuration shall include:

1. A filter rack with separate access doors shall be provided for the return air and minimum outdoor air streams

2. Unit shall be equipped with a second outdoor air intake assembly with motorized 2 position extruded aluminum, Insulated, silicone side-sealed damper for Purge and Economizer operation

3. Mechanical vestibule: The unit shall have the compressor, receiver, solenoid valves and the electrical panel in a separate compartment out of the processed air stream. All components shall be serviceable while the unit is in operation without disturbing the airflow

4. Electrical panel: The unit shall have a built-in electrical control panel in a separate compartment in order not to disturb the airflow within the dehumidifier during electrical servicing. All electrical components shall be mounted on a 16 gauge galvanized sub-panel

5. Supply Air: 2-inch MERV 8, 30% pleated filters with rust-free non-metallic structure on face loading rack.

I. Filters

1. Wherever possible, air filters shall be standard sized, replaceable, off-the-shelf filters including:

2. Exhaust Air: 2-Inch MERV 8, 30% pleated filters with rust-free non-metallic structure

3. Exhaust Air: 2-inch MERV 8, 30% pleated filters with rust-free non-metallic structure.

4. Outside Air: 2-Inch MERV 8, 30% pleated filters with rust-free non-metallic structure

5. Outside Air: Washable, aluminum media type with aluminum U-channel frame wrapped around the perimeter of crimped layers of aluminum media. The frame is designed with drain holes to ensure removal of excess water.

J. Coils

1. Evaporator/dehumidifier coils shall be designed for maximum moisture removal capacity

2. Coils shall be fully dipped and coated with a polyester/enamel coating for maximum corrosion protection. Coating shall comply with ASTM B117/D1654 and ASTM D2126 for corrosion resistance against common acids, salt and gases

3. Coil shall have galvanized casing and end plates

4. Aluminum fin and copper tubes mechanically bonded to assure high heat transfer.

5. Air reheat coils shall be sized for variable heat transfer into the air with a capacity of 100% of the compressors total required heat of rejection

6. Coils shall be fully dipped and coated with a polyester/enamel coating for maximum corrosion protection. Coating shall comply with ASTM B117/D1654 and ASTM D2126 for corrosion resistance against common acids, salt and gases

7. Coil shall have galvanized casing and end plates

8. Aluminum fin and copper tube joints mechanically bonded to assure high heat transfer

9. Coils shall have an 8-year warranty extension for a total of 10 years coverage

K. Heat Recovery Coils

1. The unit shall have heat recovery between the minimum exhaust and outdoor air streams per specifications

2. The heat recovery coils shall be sized for heat transfer between the two air streams

3. The heat recovery fluid circulating between coils shall be glycol. The module shall be a complete package and independent circuit that includes a circulating pump, fill valves and expansion tank

4. Coils shall be fully dipped and coated with a polyester/enamel coating for maximum corrosion protection. Coating shall comply with ASTM B117/D1654 and ASTM D2126 for corrosion resistance against common acids, salt and gases

5. Aluminum fin and copper tube joints mechanically bonded to assure high heat transfer

L. Drain Pans

1. Each evaporator coil shall be provided with a positive draining, compound-sloped, baked powder paint coated aluminum drain pan with fully-welded corners to ensure zero water retention

M. Blowers and Blower Motors

1. Exhaust blowers:

a. The packaged exhaust blower (EF1) shall be sized to maintain the negative pressure requirement in the space during normal operation and its operation tied to the system's occupancy scheduler

b. The blower shall be impeller plenum fan complete with backward curved, three-dimensional, profiled blades made of high performance composite material. The blower shall be completely corrosion resistant and be maintenance free a direct drive via a direct current (DC) electronic commuted (EC) motor. The EC-Motor shall have zero slippage design and have continuously variable speed control when connected to the unit's controller

c. The fan assembly shall be balanced in Class G 6.3 acc DIN ISO 1940, dymanic on two levels

d. The fan assembly shall be suitable for ambient temperatures of -40℃ to max. +70℃

e. Thermal contacts installed in the windings compliant with THCL 155

f. Drive motor in external rotor principle, sealed in protection class IP54 with moisture protection impregnation of the windings, topical protection

g. High corrosion resistance design with high quality and reliability

h. The exhaust fan shall be controlled from an end switch on the power open of the exhaust air damper

i. Shall be packaged with the heat recovery module

j. The exhaust fan assembly shall include airflow measuring stations

2. Purge blowers:

a. The ventilation/economizer/purge exhaust blower (PEA) shall be unit mounted and sized to provide full exhaust from the space when operating with EF1

b. The fan shall be direct driven axial fan made of high-strength composite material in which the motor and controller are integrated. It includes FE2owlet blades combined with guide vanes and EC commutated direct-current external rotor motors provides maximum efficiency the quietest performance. The EC motor shall have maintenance-free electronic circuitry, a rotor with permanent magnets, and an integral controller to provide the windings with electrical current so that, the motor rotates continuously and quietly. The fan is aerodynamically-optimised, sickle-blade profile, patterned with serrated trailing edge and winglets on the blade outer edge for energy and noise-optimised operation

c. The fan assembly shall be balanced in Class G 6.3 acc DIN ISO 1940, dymanic on two levels

d. The fan assembly shall be suitable for ambient temperatures of -40℃ to max. +70℃

e. Thermal contacts installed in the windings compliant with THCL 155

f. Drive motor in external rotor principle, sealed in protection class IP54 with moisture protection impregnation of the windings, topical protection

g. High corrosion resistance design with high quality and reliability

h. The exhaust fan shall be controlled from an end switch on the power open and spring return outside air damper.

3. All motors driven by a variable frequency controller shall include a maintenance free circumferential, conductive microfiber shaft grounding ring (AEGIS-SGR) to discharge shaft currents to ground.

N. Dampers

1. Internal dampers shall be made from extruded anodized aluminium with a parallel blade configuration and neoprene double-seal tips to minimize leakage. Damper blades shall be mounted on steel rods which rotate on nylon bushings. All damper hardware shall be corrosion resistant

2. The system shall be provided with normally closed outside air and exhaust air dampers equipped with spring-return actuators The dampers adjust between 0% to 100% open position.

3. The outdoor air and exhaust air dampers shall be of opposed blade configuration. Dampers shall have 0.750-inch insulated blades made from extruded anodized aluminium with neoprene double-seal tips to minimize leakage. Damper leakage shall be less than 1% of maximum flow at 4-inch water column differential. Damper blades shall be mounted on steel rods which rotate on nylon bushings. All damper hardware shall be corrosion resistant

O. Minimum Outside Airflow Measuring Elements

1. The outside air shall be monitored via factory installed air monitoring stations.

2. Stations shall not require periodic calibration or maintenance.

3. Airflow monitor measurement accuracy shall be plus or minus, 2% of reading.

4. Monitors shall be constructed of anodized rods and mounting blocks shall be 304 stainless steel.

5. Shall be permanently mounted within the unit.

6. Self-purging and self-draining counter flow design

P. Compressors

1. Hermetic, scroll action compressor, suction gas cooled, suitable for refrigerant R-410A

2. The compressor(s) shall be mounted on rubber-in-shear isolators to limit the transmission of noise and vibration

3. The compressor(s) shall be equipped with removable crankcase heater(s) for liquid migration protection

4. The compressor(s) shall be located outside the conditioned air stream in the system's service vestibule

5. Compressors shall have a 3-year warranty extension for a total of 5 years coverage

6. The compressor manufacturer must have a wholesale outlet for replacement parts in the nearest major city

Q. Refrigeration Circuit

1. The system shall consist of two factory sealed refrigeration circuits for dehumidification and sensible cooling. No site refrigeration work shall be required

2. Each refrigeration circuit shall have pressure transducers monitoring the refrigerant discharge (high) and suction (low) pressures. The refrigeration circuit shall be accessible for diagnostics, adjustment and servicing without the need for service manifold gauges

3. All refrigeration circuits shall have solenoid control valves, check valves, a liquid line filter-drier, liquid and moisture indicator, thermostatic expansion valve and a pump down solenoid valve

4. The system shall have an externally adjustable balanced port design mechanical thermostatic expansion valve. The valve shall have a removable power head

5. Tamper proof, hermetically sealed non-adjustable high and low pressure switches and refrigeration service valves shall be installed using Schrader type valves. Refrigeration service valves shall be located outside of the airstream

6. The receiver shall have two refrigerant level (maximum and minimum) indicating sight glasses

7. The suction line shall be fully insulated with 0.500-inch closed cell insulation

R. Control Panel

1. The electrical contractor shall be responsible for external power wiring and disconnect switch fusing. Power block terminals shall be provided

2. The system shall include a factory-installed non-fused disconnect

3. Shall be mounted inside the service vestibule outside of the process air stream

4. Blower motors shall be protected with thermal trip overloads

5. The system shall have a voltage monitor with phase protection

6. Available dry contacts shall include:

7. Alarm

8. Blower interlock

9. Stage 1 & 2 heating

10. Outdoor air damper control

11. Remote exhaust fan #1

12. Remote exhaust fan #2

13. Outdoor-air cooled equipment

14. System on

15. Heat recovery

16. Terminals shall be provided to send 24-volt power to the outdoor air cooled condenser or fluid cooler fan contactor

17. All wiring shall be installed in accordance with UL or CSA safety electrical code regulations and shall be in accordance with the NFPA All components used in the system shall be UL or CSA listed

18. Wiring diagrams shall be located near the electrical panel(s) on the system. These diagrams shall provide colour-coding and wire numbering for easy troubleshooting. All wires shall be contained in a wire duct.

19. The compressor(s) shall have a time delay on start to prevent short cycling

20. Pressure transducers for measuring refrigerant discharge (high) pressure and suction (low) pressure shall be provided.

21. An airflow switch and a dry contact for alarm(s) shall be provided

22. Controls supporting airflow measurement shall be provided.

S. Microprocessor Control

1. A microprocessor controller with the following characteristics will be provided:

2. All set points and parameter adjustments are pre-programmed at the factory during quality control testing

3. The microprocessor program shall be stored on updatable FLASH memory

4. A minimum of 11 analogue inputs, 4 analogue outputs, 24 digital inputs and 16 digital outputs

5. Four serial interface ports including both RS232 and RS485 types

6. An Ethernet port with RJ-45 connector and LED activity indicator

7. A real time clock to time-stamp the system operation log and to enable a programmable 7-day occupation schedule

8. Two manual demand forced modes to allow the user to manually bypass the microprocessor in the event of controller failure

9. The local and remote operator panel(s) shall have a backlit graphic liquid crystal display with touch controls

10. The system shall have pressure transducers monitoring the refrigerant discharge (high) and suction (low) pressures. The refrigeration circuit shall be accessible for diagnostics, adjustment and servicing without the need of service manifold gauges.

11. The following status LEDs shall be on the controller:

    a. Alarm - indicates there has been a failure requiring service.

    b. Dehumidification - indicates that the system is dehumidifying the space.

    c. Cooling - indicates that the air-conditioning mode.

    d. Space Heat - indicates that the space heating is operating.

    e. Maintenance - indicates whether or not maintenance is required.

    f. Manual - indicates that the system has been set to manual operation.

    g. The following set points shall be accessible and adjustable from the operator panel:

    h. Space temperature

    i. Space relative humidity

j. Supply Airflow

k. Min Outside Air %

l. Space Pressure %

12. The following sensors shall be unit-mounted and monitored at the operator panel. All information from these items shall be actively used in the system control and operation strategies:

a. Refrigerant high pressure

b. Refrigerant low pressure

c. Return air temperature

d. Supply air temperature

e. Return air relative humidity

f. Evaporator leaving air temperature

g. Suction temperature

h. Discharge temperature

i. Supply Airflow

j. Min Outside Airflow

k. Min Exhaust Airflow

13. System Fault: Shall indicate via text message to the display what systems require attention or servicing. Built-in monitoring and diagnostics shall allow the user to view the following:

a. Power failure

b. Dirty air filter

c. Refrigerant high and low pressure

d. System off

e. Anti-short cycle delay

T. Auxiliary Air Heating (Indoor Units)

1. The packaged hot water coil shall be sized to meet the scheduled heating capacity and have the following characteristics:

2. Modulating (0-10V) auxiliary air heat control by means of a factory mounted and wired three-way control valve

3. Auxiliary air heating coil tubes, fins, headers, casing and end-plates shall be fully protected by a polyester/enamel coating for maximum corrosion protection. The protective coating shall comply with ASTM B117/D1654 and ASTM D2126 for corrosion resistance against common acids, salts and gases

4. Coil casing and end-plates shall be made of galvanized steel

5. Fin and tube joints shall be mechanically bonded to ensure high heat transfer

6. Fins shall be made of aluminium

7. Tubes shall be made of copper

8. The maximum loop operating pressure shall not be less than 250 psig

U. Air Heating (Outdoor Units)

1. The packaged indirect-fired natural gas duct furnace module shall be sized to meet the scheduled heating capacity and have the following characteristics:

2. Modulating (0-10V) auxiliary air heat control.

3. The duct furnace module shall be a natural gas indirect-fired type using spark ignition with a heating capacity as indicated on the drawings and is installed in a blow-through configuration downstream from the blower. The heat exchanger tubes are constructed of formed and welded 16-gauge series 409 stainless steel suitable for installation downstream of cooling coil and satisfactory for air inlet temperatures below 40℉. Theburner is the power fir ing type and incorporates a primary combustion air blower and spark ignition transformer.

4. Standard controls shall include a modulating gas valve, intermittent spark ignition, overheat control, rollout flame supervision, combustion air flow proving switch, positive burner safety switch, pilot cock, main gas cock with 100% shut-off, adjustable main and pilot pressure regulators.

5. The natural gas duct furnace module shall be an ETL recognized component. The gas train shall be complete with all controls factory mountd to comply with requirements of ETL. The gas train is complete with a modulating main gas valve and is ready for connection to a natural gas supply with pressure between 7 and 14 inches W.C.

6. The complete system shall be test-fired and preliminary adjustments made prior to leaving the factory.

V. Remote Fluid Coolers

1. Air-cooled air conditioning via a fluid cooler

2. The system shall be equipped with an air conditioning mode where excess compressor heat is rejected to a remote outdoor air-cooled heat exchanger (aka Dry Cooler) via a single glycol fluid loop. No site refrigeration work shall be required. The system shall include a circulating pump and expansion tank. The packaged fluid cooled condenser and remote outdoor air-cooled heat exchanger shall both be capable of rejecting 100% of the compressor heat rejection with an air on temperature at summer design conditions

3. The system shall be provided with a dry contact rated for 24VAC/5A to operate the remote outdoor fluid cooler control

4. Each refrigeration circuit shall include refrigerant valves, a receiver with pressure relief valve set at 650 psig, a pressure control valve and a pressure differential valve, and two manual shutoff valves to isolate the outdoor fluid cooler

5. Coils shall be tested at 425 PSIG and mounted vertically for complete surface utilization. Coils shall be counter flow and have adequate capacity to dissipate the total heat rejection of the system at design conditions

6. The fan(s) shall be direct driven axial fan(s) with dual speed external rotor motor(s) and innovative bionic blades in die-cast aluminum moulds

7. The fan assembly shall be balanced in Class G 6.3 acc DIN ISO 1940, dynamic on two levels

8. The fan assembly shall be suitable for ambient temperatures of -40℃ to max. +70℃

9. Thermal contacts installed in the windings compliant with THCL 155

10. Drive motor in external rotor principle, sealed in protection class IP54 with moisture protection impregnation of the windings, topical protection

11. High corrosion resistance design with high quality and reliability

W. Factory Performance Testing

1. A. The system shall be thoroughly tested under factory test conditions. A copy of the original test report shall be available to the engineer upon request

2. Microprocessor controls shall be factory adjusted and pre-set to the design conditions during testing

PART 3 EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

B. Install unit where shown on drawings. Provide proper clearances around unit for airflow and service.

C. Provide and install all water piping, drains and controls for proper operation of unit.

D. Pumps, piping, valves, etc., required to accomplish interconnections described above and/or as shown on drawings shall be provided.

F. Contractor shall mount and wire space thermostat and humidistat in location shown on Drawings.

G. Power wiring and disconnects shall be provided and installed by Division 26 Contractor.

H. Interconnecting refrigerant piping from Pool dehumidification units and associated remote condensing units to be installed by Contractor. Sizing and routing of refrigerant piping to be coordinated with unit manufacturer for proper operation of all equipment.

I. Control wiring from items shipped loose by the unit manufacturer shall be the responsibility of the contractor.

3.02 CHECK-TEST-START PROCEDURE

A. Startup service shall be provided by the equipment manufacturer's authorized representative and shall include complete testing of all controls and unit operation. The agency responsible for startup shall record the refrigeration pressures and electrical operating date. Copies of this data are to be supplied to the Owner and Engineer.

B. All units shall be thoroughly cleaned by the installing contractor in accordance with the manufacturer's instructions prior to being placed into service.

C. A complete operating and maintenance manual, including wiring diagrams, startup and operating sequence and material list shall be provided to the Owner.

D. The Owner shall be provided with complete instruction of operating and maintenance procedures.

3.03 Sequence of Operation

A. System Startup

1. Power is turned on or the system is restarted

2. After a short initial delay to allow the sensors to stabilize, the blower starts and operates continuously

3. Based on sensor feedback, the system shall begin or resume operation based on the sequence below

B. Airside Configuration

1. The system continuously delivers the specified supply air volume to the natatorium

2. The minimum exhaust air flow is actively controlled to meet the engineer's schedule.

3. The minimum outdoor air flow is actively controlled to meet the engineer's schedule.

C. Dehumidification Mode

1. Return air dewpoint is above dewpoint setpoint.

2. The compressor enters the Compressor Start sequence

3. If the system cannot maintain the relative humidity below setpoint, the second compressor circuit will start

4. Compressor waste heat is rejected into a glycol fluid loop which feeds the reheat coils and the air conditioning air-cooled heat exchanger in parallel.

5. The reheat coils are fully modulating (0-100%). The reheat output will modulate to maintain the space temperature at set point year-round

D. Air Conditioning Mode

1. The return air temperature is above the room temperature setpoint

2. The compressor starts, if not already operating in Dehumidification Mode

3. Excess compressor hot gas is diverted to a fluid-cooled heat exchanger. Up to 100% of compressor heat is rejected into the glycol fluid loop which is pumped outdoors to an outdoor air-cooled heat exchanger for 100% heat rejection at summer design ambient conditions

4. 100% of compressor heat is rejected at the outdoor air-cooled heat exchanger on a summer design day. On off-peak days, the air reheat output will modulate to maintain the space temperature at the set point

5. If the system cannot maintain the return air temperature setpoint, the second compressor will start

E. Space Heating Mode

1. The return air temperature is below the room temperature setpoint

2. The microprocessor space heating output signal (0-10 volts) is sent to the heating coil controller. The signal output will regulate based on the return air temperature

F. Exhaust Air Heat Recovery Mode

1. The minimum outdoor air damper and minimum exhaust fan(s) are tied to the system's occupancy schedule and will operate as programmed

2. Once the outdoor air temperature falls below the heat recovery setpoint (65 ℉ by default; field-adjustable) the glycol pump shall circulate a glycol mixture between the exhaust air and the outdoor air heat recovery coils, recovering heat from the space condition exhaust air and using it to preheat the incoming outside air

G. Purge Mode

1. This mode is manually triggered by an operator when super-chlorinating the pool. It can be triggered at the unit-mounted or optional remote operator panel(s), through the online Virtual-Tech interface or by the BACnet controller

2. Purge Mode has an adjustable timed duration after which the system automatically resumes normal operation

3. Once triggered by the operator:

a. The compressor(s), if operating, pump down and cycle off

b. A signal from the microprocessor sets the exhaust fan(s) to their maximum CFM

c. The unit-mounted outdoor air dampers open fully and the return air dampers close

d. The system stays in 100% outdoor air ventilation mode

e. After the timed period expires, all dampers and fans return to normal operating settings and the system resumes normal operation

f. During Purge Mode, the system will control heating based on supply air temperature

H. Economizer Cooling Mode

1. The return air temperature is above the room temperature setpoint

2. The microprocessor will compare the temperature of the outside air with the cooling setpoint

3. When outside air is deemed suitable by the microprocessor, it will be used as the first stage of sensible cooling

4. When outside air as determined to be suitable by the microprocessor, it will be used as the first source of cooling.

5. The system will switch over to using the compressor(s) if outside air conditions cannot satisfy the space cooling demand

I. Economizer Dehumidification Mode

1. The return air relative humidity is above humidity setpoint

2. The microprocessor will compare the moisture content of the outside air to the dehumidification setpoint

3. When the outside air is deemed suitable by the microprocessor, it will be used as the first stage of dehumidification

4. When outside air as determined to be suitable by the microprocessor, it will be used as the first source of cooling.

5. The system will switch over to using the compressor(s) if outside air conditions cannot satisfy the space humidity demand.

J. Freeze Protection

1. The supply air temperature falls below the freezestat setpoint or the optional freezestat sensor indicates a freezestat condition

2. Exhaust fan(s) are stopped and outdoor air damper(s) are fully closed

3. When the freezestat alarm is tripped, it must be manually cleared by the operator

END OF SECTION

SECTION 23 74 13 - PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
   1. Direct-expansion cooling.
   2. Heat-pump refrigeration components.
   3. Hot-gas reheat.
   4. Gas furnace.
   5. Economizer outdoor- and return-air damper section.
   6. Energy Recovery.
   7. Integral, space temperature controls.
   8. Vibration Isolation Roof curbs.

1.3 DEFINITIONS

A. DDC: Direct-digital controls.

B. ECM: Electrically commutated motor.

C. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

D. Outdoor-Air Refrigerant-Coil Fan: The outdoor-air refrigerant-coil fan in RTUs. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

E. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

F. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

G. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

1.4 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. Coordination Drawings: Plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Structural members to which RTUs will be attached.
   2. Roof openings
   3. Roof curbs and flashing.

1.5 INFORMATIONAL/QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT DOCUMENTS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. ARI Compliance:
   1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
   2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. ASHRAE Compliance:
   1. Comply with ASHRAE 15 for refrigeration system safety.
   2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
   3. Comply with ASHRAE/IESNA 90.1 for minimum efficiency of heating and cooling.

C. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.

D. UL Compliance: Comply with UL 1995.

E. Electrical Components, Devices, and door

F. ories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
   1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
   2. Warranty Period for Gas Furnace Heat Exchangers: Manufacturer's standard, but not less than ten years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Filters: One set of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Carrier Corporation.
   2. Daikin
   3. Trane; American Standard Companies, Inc.
   4. Johnson Controls.

2.2 CASING

A. Cabinet: Zinc-coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B45. Structural members shall be a minimum of 16 gauge with access doors and removable panels of minimum 20 gauge.

B. Panels: 2" double-wall foamed panel construction throughout the indoor section of unit to provide nonporous, cleanable interior surfaces. All interior seams exposed to airflow shall be sealed.

C. Insulation: 2" polyisocyanurate Foam metal encapsulated with no exposed edges. Initial R value of 6.6 per inch of thickness.

D. Cabinet construction shall provide access panels for all parts requiring service.

E. Cabinet top cover shall be one piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.

F. Panels: Water- and air-tight hinged panels with handles shall provide access to filters, heating section; ERV and power exhaust fan section, supply air fan section, evaporator coil section, and unit control section. Door hardware shall be oriented to allow the door swing to be reversed.
   1. Latches with hold down hooks will be factory installed on hinged access doors.

G. Access Doors: Access doors shall be hinged with a single, exterior mounted height and tension adjustable handle to provide positive latching at three points. Access doors shall provide a door stop mechanism to latch the door in the open position to prevent unsafe door closure by the wind. Serviceable compartments in the air handler such as filters, evaporator coil, supply fan and variable frequency drives shall have doors of laminated, double-wall construction. This construction shall be insulated between the interior and exterior with a minimum insulating value of R9.

H. Condensate Drain Pans: Formed sections of stainless-steel sheet, a minimum of 2 inches deep, and complying with ASHRAE 62.
   1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
   2. Drain Connections: Threaded nipple.

2.3 FANS

A. Direct-Driven Supply-Air Fans: Double width, forward curved or backward inclined, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.

B. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.

C. Relief-Air Fan: Forward curved or backward inclined, shaft mounted on permanently lubricated motor.

D. Fan Motor: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

E. All motors driven by a variable frequency controller shall include a maintenance free, circumferential, conductive microfiber shaft grounding ring (AEGIS-SGR) to discharge shaft currents to ground.

F. Provide a supply/return airflow measurement (Piezometer) system. The supply fan shall have an airflow measurement device to measure differential pressure and calculate fan airflow. The device shall be capable of measuring airflow within +/- 5 percent total accuracy when operating with the stable operating region of the fan curve. Fan airflow performance and noise levels shall not be affected by the installation of the device. The fan inlet shall not be obstructed by the airflow measurement device.

2.4 COILS

A. Supply-Air Refrigerant Coil:
1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
3. Coil Split: Interlaced.
4. Coating.
5. Condensate Drain Pan: Stainless steel formed with pitch and drain connections complying with ASHRAE 62.

B. Outdoor-Air Refrigerant Coil:
1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.

C. Hot-Gas Reheat Refrigerant Coil:
1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.

2.5 AIR-TO-AIR ENERGY RECOVERY

A. Casing:
1. Steel, with manufacturer's standard paint coating.
2. Integral purge section limiting carryover of exhaust air to between 0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg differential pressure.
3. Casing seals on periphery of rotor, on duct divider, and on purge section.
4. Support rotor on grease-lubricated ball bearings with extended grease fittings. Mount horizontal wheels on tapered roller bearing.

B. Rotor: Aluminum, segmented wheel, strengthened with radial spokes, with nontoxic, noncorrosive, silica-gel desiccant coating.

C. Drive: Fractional horsepower motor and gear reducer, with speed changed by variable frequency motor controller, and self-adjusting multilink belt around outside of rotor.

D. Variable-Frequency Motor Controller: Comply with the requirements of Division 23 Section “Variable-Frequency Motor Controllers”.

E. All motors driven by a variable frequency controller shall include a maintenance free, circumferential, conductive microfiber shaft grounding ring (AEGIS-SGR) to discharge shaft currents to ground.

2.6 REFRIGERANT CIRCUIT COMPONENTS

A. Units shall have cooling capabilities down to 0 degree F as standard. For field-installed low ambient accessory, the manufacturer shall provide a factory-authorized service technician that will assure proper installation and operation.

B. Provide each unit with required number of refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.

C. Compressor: Hermetic, digital scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.

D. Digital scroll compressors shall be provided on both refrigerant circuits where indicated.

E. Variable speed compressors shall be provided on both refrigerant circuits where indicated. Variable speed compressors shall be capable of speed modulation from 25 Hz to a maximum of 100 Hz. The minimum unit capacity shall be 15% of the full load or less. The compressor motor shall be a permanent magnet type. Each compressor shall have a crankcase heater installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Compressors shall be equipped with a bearing oil injection system that optimizes bearing and scroll set lubrication, sealing and controls the oil circulation rate. Each variable speed compressor shall be matched with a specially designed variable frequency drive with modulates the speed of the compressor motor and provides multiple compressor protection functions. Control of the variable speed compressor and inverter shall be integrated with the unit controller.

F. Refrigeration Specialties:
1. Refrigerant Charge: R-410A.
2. Expansion valve with replaceable thermostatic element.
3. Refrigerant filter/dryer.
4. Manual-reset high-pressure safety switch.
5. Automatic-reset low-pressure safety switch.
6. Minimum off-time relay.
7. Automatic-reset compressor motor thermal overload.
8. Brass service valves installed in compressor suction and liquid lines.
9. Low-ambient kit high-pressure sensor.
10. Four-way reversing valve with a replaceable magnetic coil, thermostatic expansion valves with bypass check valves, and a suction line accumulator.

2.7 AIR FILTRATION

A. General Requirements for Air Filtration Section:
1. Comply with NFPA 90A.
2. Provide minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
3. Provide filter holding frames arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

B. Disposable Panel Filters:
1. Factory-fabricated, viscous-coated, flat-panel type.
2. Thickness: 2 inches.
3. Arrestance (ASHRAE 52.1): 80.
4. Merv (ASHRAE 52.2): 8.
5. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
6. Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.

C. Extended-Surface, Disposable Panel Filters:
1. Factory-fabricated, dry, extended-surface type.

2. Thickness: 4 inches.
3. Arrestance (ASHRAE 52.1): 90.
4. Merv (ASHRAE 52.2): 13.
5. Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.
6. Media-Grid Frame: Galvanized steel.
7. Mounting Frames: Welded, galvanized steel, with gaskets and fasteners, suitable for bolting together into built-up filter banks.

2.8 GAS FURNACE

A. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47 and NFPA 54.
1. CSA Approval: Designed and certified by and bearing label of CSA.

B. Burners: Stainless steel with a minimum thermal efficiency of 80 percent.
1. Fuel: Natural gas.
2. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.

C. Heat-Exchanger and Drain Pan: Stainless steel.

D. Heat Exchanger Modulation: Minimum 10:1 turndown ratio.

E. Venting: Gravity vented.

F. Safety Controls:
1. Gas Control Valve: Modulating.
2. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

2.9 DAMPERS

A. Low Leak Economizer Damper: Low leak damper shall be provided with rolled stainless steel jamb seals to the sides of the damper assembly. Low leak economizer dampers shall have a leakage rate of 10 cfm/square foot or less tested in accordance with AMCA Standard 500.

B. Provide a fully integrated 100% modulating outside air economizer with unit return and barometric relief air dampers, minimum position setting, preset linkage, wiring harness with plug. Unit operation is through primary temperature controls that automatically modulate dampers to maintain space temperature conditions.

C. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
1. Damper Motor: Modulating with adjustable minimum position.
2. Relief-Air Damper: Modulating with bird screen and hood.

D. Provide spring return motor for outside air damper closure during unit shutdown or power intertuption.

2.10 ELECTRICAL POWER CONNECTION

A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.11 CONTROLS

A. Control equipment and sequence of operation are specified in Division 23 Section "Instrumentation and Control for HVAC."

B. DDC Controller:
   1. Controller shall have volatile-memory backup.
   2. Safety Control Operation:
      a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
      b. Fire Alarm Control Panel Interface: Provide control interface to coordinate with operating sequence described in Division 28 Section "Fire Detection and Alarm."
      c. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F.
      d. Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence.

C. Interface Requirements for HVAC Instrumentation and Control System:
   1. Provide BACnet interface for communication with the building automation system (BAS). The unit shall be fully integrated into the Owner's existing BAS. Communication protocol shall be coordinated with the Temperature Control Contractor.

2.12 ACCESSORIES

A. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection, furnished by unit Manufacturer, powereded by Division 26 Contractor.

B. Coil guards of painted, galvanized-steel wire.

C. Provide outside air measurement device. Airflow measurement device can be either factory mounted or installed in the field. The device shall be installed in the outside air opening or airstream and accurately measure the airflow. The airflow measurement device shall be suitable for installation in rooftop units and adjust for temperature variations.

2.13 ROOF CURBS

A. Roof curbs with vibration isolators and wind or seismic restraints are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

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

3.2 INSTALLATION

A. Equipment Mounting: Install RTUs on structural roof curb.

B. Roof Curb: Install on roof structure or concrete base, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." and ARI Guideline B. Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Division 07 Section "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing with anchor bolts.

C. Unit Support: Install unit level on structural curbs or pilings. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.
1. Gas Piping: Comply with applicable requirements in Division 23 Section "Facility Natural-Gas Piping" Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.

C. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Division 23 Section "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.

C. Tests and Inspections:
1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to furnace combustion chamber.
3. Inspect for visible damage to compressor, coils, and fans.
4. Inspect internal insulation.
5. Verify that labels are clearly visible.
6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Verify that filters are installed.
9. Clean condenser coil and inspect for construction debris.
10. Clean furnace flue and inspect for construction debris.

11. Connect and purge gas line.
12. Remove packing from vibration isolators.
13. Inspect operation of barometric relief dampers.
14. Verify lubrication on fan and motor bearings.
15. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
16. Adjust fan belts to proper alignment and tension.
17. Start unit according to manufacturer's written instructions.
    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.
18. Inspect and record performance of interlocks and protective devices; verify sequences.
19. Operate unit for an initial period as recommended or required by manufacturer.
20. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency.
    a. Measure gas pressure on manifold.
    b. Inspect operation of power vents.
    c. Measure combustion-air temperature at inlet to combustion chamber.
    d. Measure flue-gas temperature at furnace discharge.
    e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
    f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
21. Calibrate thermostats.
22. Adjust and inspect high-temperature limits.
23. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
24. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:
    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
25. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
26. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.
    d. Outdoor-air intake volume.
27. Simulate maximum cooling demand and inspect the following:
    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
28. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
    a. High-temperature limit on gas-fired heat exchanger.
    b. Low-temperature safety operation.
    c. Filter high-pressure differential alarm.
    d. Economizer to minimum outdoor-air changeover.
    e. Relief-air fan operation.
    f. Smoke and firestat alarms.
29. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 74 13

SECTION 23 82 33 - CONVECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Flat-pipe steel radiators.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.

B. Color Samples for Initial Selection: For units with factory-applied color finishes.

1.4 CLOSEOUT DOCUMENTS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Operation and Maintenance Data: For convection heating units to include in emergency, operation, and maintenance manuals.

1.5 WARRANTY

A. Warranty Period for Unit: manufacturer's standard, but not less than 5 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FLAT-PIPE STEEL RADIATORS

A. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:
   1. Panel Radiator, Inc., a div. of Hydro-Air Components.
   2. Runtal North America, Inc.
   3. Rittling

B. Heating Elements: Steel, welded and formed into flat, square, steel header with minimum thickness of 0.109 inches. Include threaded piping and air vent connections.

C. Medium pressure rating required. Working pressure shall be at 85 psi maximum pressure, test pressure shall be 110 psi maximum.

D. Mounting: Wall brackets or floor pedestals as indicated on the drawings. Wall bracket and floor pedestal spacing shall be as recommended by manufacturer.

E. Finish: Provide a custom color for selection by A/E.

F. Accessories:
   1. Steel piping covers finished to match radiator finish.
   2. All welded perforated top grille to hide fins.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive convection heating units for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for hydronic-piping connections to verify actual locations before convection heating unit installation.

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

3.2 FLAT-PIPE STEEL RADIATOR INSTALLATION

A. Install units level and plumb.

B. Install piping covers.

3.3 CONNECTIONS

A. Piping installation requirements are specified in Division 23 Section "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect hot-water units and components to piping according to Division 23 Section "Hydronic Piping."
   1. Install shutoff valves on inlet and outlet, and balancing valve on outlet.

C. Install control valves as required by Division 23 Section "Instrumentation and Control for HVAC."

D. Install piping adjacent to convection heating units to allow service and maintenance.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, start units to confirm proper convection heating unit operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace convection heating units that do not pass tests and inspections and retest as specified above.

END OF SECTION 23 82 33

SECTION 27 11 13 – COMMUNICATIONS ENTRANCE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes, but is not limited to:

1. Communications entrance protection

B. Related sections include the following:
1. Division 26 – Electrical
2. Division 27 – Communications
3. Division 28 – Electronic safety and security

1.2 DESCRIPTION OF WORK

A. The Contractor shall provide and install all equipment and accessories necessary for complete and operational service entrance protection as indicated on the drawings and specified herein.

B. Provide service entrance protection for all communications cabling entering the building. Communications cabling requiring service entrance protection includes but is not limited to outside plant cable and cables installed in underground conduits.

1.3 QUALITY ASSURANCE

A. The Communications Entrance Protection System components and equipment shall be listed by Underwriters Laboratories, Inc., and the components shall bear the UL label.

B. The Communications Entrance Protection System shall be installed in accordance with all requirements set by all applicable standards, codes, and regulations including but not limited to the standards referenced in Section 270500 – Common Work Results for Communications.

C. All equipment and installation practices shall comply with the latest BICSI (TDMM) standards.

D. Installer shall employ or have a contract with a Registered Communications Distribution Designer (RCDD) registered with the Building Industries Consulting Services International (BICSI).

E. Installer must have personnel certified by BICSI on staff.

1. Installation Supervision: Installation shall be under the direct supervision of ITS Technician
2. Field Inspector: Currently registered by BICSI as an RCDD to perform the on-site inspection.

1.4 SUBMITTALS

A. Refer to Section 270500 – Common Work Results for Communications for more information.

B. Submittals shall be submitted in electronic format (PDF).

1.5 CLOSEOUT DOCUMENTATION

A. Refer to Section 270500 – Common Work Results for Communications for more information.

B. Closeout documentation shall be submitted in electronic format (PDF).

1.6 WARRANTY

A. All components, parts, and assemblies of the Communications Entrance Protection System supplied by the installer shall be guaranteed against defects in materials and workmanship for a period of 5 years by the manufacturer and installer.

B. Warranties shall include all labor, material, travel expenses, test equipment, equipment rental and any other expense required to troubleshoot, remove, repair or replace equipment or components to bring the system up to the original performance criteria and operation.

C. Warranty services shall be provided by an installer certified by the equipment manufacturer during normal business hours.

D. Provide warranty certificate as part of the closeout documentation.

PART 2 - PRODUCTS

2.1 COMMUNICATIONS ENTRANCE PROTECTION

A. Provide communications entrance protection that shall provide primary and secondary protection that safeguards communications equipment from damaging electrical surges that could travel through communications cabling.

B. The communications entrance protection shall:
1. Include a protector module with the quantity of terminations and termination type for each type of communications cable installed with service entrance protection.
2. Include space for splicing of communications cabling.
3. Be grounded to the building grounding system.

C. Approved manufacturers:
1. Commscope
2. Porta Systems
3. Emerson
4. Circa

2.2 POWER OVER ETHERNET SURGE PROTECTOR

A. Provide power over ethernet surge protector where indicated on the drawings that shall provide protection for communications equipment from damaging electrical surges that could travel through communications cabling.

B. The power over ethernet protector shall meet the following requirements:
1. Compatible with Cat 5e, Cat 6, Cat 6A cabling
2. PoE Standards: 802.3af, 802.3at, 802.3bt Type 3, 802.3bt Type 4.
3. Connector: RJ45 female in/out
4. UL listed

C. Provide ground connection to telecommunications grounding system.

D. Approved manufacturers:
   1. Ditek DTK-MRJPOE

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide all components for the communications entrance protection system as specified herein and as shown on the drawings.

B. The communications entrance protection system shall be installed in accordance with TIA standards-based recommendations, the manufacturer's recommendations/installation guides, and industry best practices.

C. The communications entrance protection system shall be installed on the plywood backboard located in the TR or MC/ER unless noted otherwise.

D. All service loops shall be properly supported.

3.2 LABELING

A. Identify system components, wiring, and cabling complying with ANSI/TIA-606-C and coordinate with the Engineer and Owner.

B. Cables shall be identified by a self-adhesive, wrap around label at both ends. The cable label shall be applied to the cable behind the faceplate, on a section of cable that can be accessed by removing the cover plate.

C. All labels shall be typed and printed. Handwritten labels will not be accepted.

D. Refer to technology drawings for more information on labeling.

E. Refer to specification section 270553 – Identification for Communications Systems for more information.

END OF SECTION 27 11 13

SECTION 27 41 00 - PROFESSIONAL AUDIO SOUND REINFORCEMENT SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Natatoriums Sound Reinforcement
B. AV Connectivity and Video Infrastructure
C. Performance Optimization/Commissioning (“Quiet Day”)
D. Division 26 Field Coordination
E. Test Allowance

1.2 RELATED WORK

A. Division 01 – General Requirements
B. Division 26 – Electrical
C. Division 27 – Communications
D. Section 27 05 00 - Common Work, (Qualifications, Submittals)

1.3 QUALITY ASSURANCE

A. Integrator/Dealer: The AV Contractor (AVC) shall be a factory-authorized and certified integrator/dealer specializing in each selected manufacturer’s products with local, trained, and certified in-house local personal qualified for this work.

B. AV Contractor shall have demonstrated at least 5 years prior experience with professional audio and video systems installation, including audio software programming, detailed AV CAD submittals, acoustic testing with an appropriate software platform and capability for broadcast video work.

1. Qualified AV Contractors shall attend the prebid meeting and inspect the site prior to bidding for locations, access, and pathways of existing conditions.

a. Existing facility is tied to new facility for sound and AV. AVC shall coordinate Division 26 paths for new conduit on site.

b. AVC shall verify existing building conditions for plenum spaces. Always use plenum cable for any plenum space unless cable is in conduit, no exception.

C. Manufacturer: The manufacturer of equipment shall have warranty support for all products installed. Distribution and second step intermediaries on primary or key components are not desired.

D. AV Contractor shall own and be experienced with a TYPE I or TYPE 2 calibrated audio test microphone with software testing platform and be trained for electro-acoustic testing of professional grade sound systems with software control management.

1. Quality assurance requires certified audio testing and is noted herein.

2. Testing with phone apps, iPad, iPhone, and Android phones are never accepted alone for qualified audio testing. IOS software may be used, only if a Type 1 or 2 calibrated mic and precision interface is also used and a calibration certificate is current.

3. Basis of Audio Test platform is NTI meeting industry standards. Equal test platforms will only be approved with a current microphone calibration certificate dated 2021 or 2022 or as stated herein.

E. The following contractor qualifications are required for quality assurance and have been endorsed by the Audiovisual and Integrated Experience Association (AVIXA), also known as InfoComm International.

1. The AV Contractor shall employ in-house, a Certified Technology Specialist with a specialized Installation endorsement (CTS-I), or a Certified Technology Specialist with a specialized Design endorsement (CTS-D) on staff and supervising this project locally. This service shall not be subcontracted and is included for quality control and performance requirements.

a. While BICSI and other security or low voltage certifications for IT and data are helpful, they do not meet professional audio requirements for this Section of the project.

b. The A/E may also approve other AV or professional audio certifications and experience that meet or exceed these AV industry requirements to allow responsive bidding.

2. In addition to supervising the project, the Certified Technology Specialist (CTS-I or CTS-D) shall perform the following tasks on the project:

a. Produce detailed CAD submittals and shop field drawings.

b. Provide a letter with submittals stating the site has been field inspected as noted on plans and coordinated with the prime contractor and Division 26 before electrical installation rough-in dates.

c. Coordinate PE rated supplemental overhead suspensions for submittals.

d. Orchestrate testing and coordinate a “Quiet Day” with the Prime Contractor and the A/E design firm for this Section.

e. See Commissioning requirements performed prior to Owner training dates.

1) Provide AV test and readiness report as specified and dated at least one week or more before Commissioning “Quiet Day”.

2) Demonstrate and provide test and mic calibration compliance for all professional audio work in this Section.

F. AV Contractor (AVC) shall provide a résumé of prior experience with bid in similar types and scales of projects, including other projects that may have been completed with this project client. This is in addition to Section 27 05 00 requirements.

1. References shall include three (3) project names and locations, estimated AV budget, and simple AV description of system with primary product lines (DSP and loudspeakers).

2. Forward information on the bid date for distribution to the architect and A/E.

G. AV Control System Dealer: A new media control system shall be provided and updated, terminated, installed, and programmed by a factory-authorized and certified dealer and

integrator in good standing with the manufacturer. The dealer shall have direct purchasing and support authority. These services shall not be subcontracted.

H. AV Control System Programmer: A new media control system shall be programmed by a factory-trained and certified programmer beginning his work during submittals and completed before Quiet Day of AV commissioning.

1. The AV Contractor shall have all certifications required on staff for the appropriate duties and responsibilities and as required by the Basis of Design and approved manufacturers.

a. The control system programmer shall have all refresher courses completed for the latest features of the control platform prior to bidding the project, to ensure that the AV Contractor is up to date with the latest software and features and ability to respond to the project.

I. Audio System Digital Signal Programmer (DSP): All digital sound processing equipment (DSP) used on the project shall be setup, programmed, properly gain staged and calibrated by a factory-trained technician under the consistent employ of the AV Contractor. This shall not be subcontracted and is a fundamental requirement of this project for an integrated system, in preparation for the Quiet Day during a scheduled Commissioning of the system.

J. The audio system programmer shall have the following complementary certifications:

1. Associated manufacturer training and certification for DSP used and approved for the project.

2. Calibrated test mic & acoustic testing resume for bid date.

3. Dante Level III.

K. Video System Programmer: Any video distribution and processing used on the project shall be programmed by a factory-trained and certified technician, including fiber terminations.

1. The contractor shall become familiar with the video scoreboard system and its inputs for display of an Owner-provided production video system input.

2. The contractor shall coordinate installation of infrastructure for video acquisition, including specified cameras and paths. The Owner-provided portable video gear will be identified during the project and shall be coordinated with submittals and infrastructure as part of this scope of AV work.

L. The Contractor shall have acquired and maintained all certifications for a minimum of one (1) month prior to the posted bid date of this project.

M. Servicing Contractor: The installer must be factory certified to provide support and warranty service on the local installed equipment and must have local service representatives within a 100 mile radius of the project site.

1.4 REFERENCES

A. ADA - Americans with Disabilities Act
B. ADAAG - Americans with Disability Accessibility Guidelines
C. ANSI - American National Standards Institute
D. AVIXA – Audiovisual and Integrated Experience Association (Formerly InfoComm)
E. ANSI/InfoComm A102.01:2017 - Audio Coverage Uniformity
F. ANSI/InfoComm 2M-2010 - Standard Guide for Audiovisual Systems Design and Coordination Processes

G. ANSI/InfoComm F501.01:2015 – Cable Labeling for Audiovisual Systems
H. ANSI/InfoComm 10:2013 – Audiovisual Systems Performance Verification
I. IBC - International Building Code
J. IEC - International Electrotechnical Commission
K. NFPA 70 - National Electrical Code (NEC)
L. UL 813 - Commercial Audio Equipment
M. UL 1419 – Professional Video and Audio Equipment
N. UL 1492 – Audio/Video Products and Accessories
O. Syn Aud Con - Sound System Training and Certifications

1.5 SUBMITTALS

A. Submit shop drawings and product data are under general provisions of Section 27 05 00 and are added to this Section requirements.

B. To expedite responses for audio and AV submittals in this Section, submittals may be "stepped" as noted herein instead of waiting for all aspect to complete. This does not apply to other systems or submittals in other sections.

C. General Requirements:

1. Submittals shall be provided in multiple passes. Each pass will be a dedicated single submission for review as outlined and coordinated with Section 27 05 00. Re-submittals for each pass are not anticipated due to multiple passes being allowed.

2. Should the Contractor not provide shop drawings and coordination in a timely fashion, not complete requirements, or extend the time with resubmittals to jeopardize schedules, cause delay or limit access for field work, the Contractor bears responsibility for impact and delay that may occur. This includes high access, lift work over a pool, overhead positions for precision loudspeaker aim, coordination with high lighting, AV cameras, and associated protection of work already in place, as well as his rework.

D. *First Pass* AV Qualification Submittals: In addition to other Quality Assurance noted, the AVC shall submit after the project is awarded and with his product data submittals:

1. Contractor(s) qualifications noted in this Section.

2. Current certifications, office location, lead technical staff with certs associated with this project as noted herein.

3. Applicable Integrated Experience Association (AVIXA) certifications. Qualifications from InfoComm that have not expired are accepted.

4. Refer to the qualifications in Section 27 05 00 and include for additional information. Certifications include, but are not limited to:

a. Manufacturer certifications used on this project.
b. Control system authorized dealer certification.
c. Control system certified programmer certification(s).
d. Audio system DSP dealer certification.
e. Audio system DSP programmer certification.
f. Calibrated audio test mic model with serial number and calibration date
g. Applicable networking certifications.

5. If any alternate manufacturer(s) certification might be submitted, the equivalent certifications to the Basis of Design manufacturer(s) shall be required and submitted for quality and performance assurance.

E. *First Pass* Product Submittals: To be submitted in a timely fashion with qualifications and before any equipment is ordered, installed, configured, or programmed. Submitted product shall be a detailed material/product list and show the following:

a. Summary Page: A materials list by model and manufacturer.

1) Note any approved substitutions used apart from the Basis of Design.

b. Product Data: Provide manufacturer's technical product data sheet annotated for each product to be installed:

1) Multiple products without identity of installed product will be rejected without review

2) Include all component options and accessories specific to this project and shall be noted including each suffix or variation annotated for the product to be installed.

3) Electrical power rating and voltage, including 20 and 30-amp requirements if any.

4) Wiring requirements and accessories required.

5) Pre-terminated cable distance requirements identified. For different rooms, annotate room as required.

6) Typical factory schematics or manuals are not an acceptable format. Annotated models that are used in the project are required.

7) Include portable equipment when in Division 27 specifications or Technology Schedule.

8) For any reused owner items, acknowledge site inspection has happened or date it will be performed for existing conditions.

c. Alternate System Drawings: If any approved alternate manufacturer is submitted, the Contractor shall provide project specific CAD drawings. These will be required to be submitted with the product data step.

d. Review available wireless microphone frequencies within a 50 mile range based on the submitted system(s) and coordinated with the number of channels.

F. *Second Pass* - Shops Drawing Submittals: To be submitted after all initial submittals have been approved but before equipment is configured and programmed. These should be submitted during the pre-installation phase or as outlined in Part 3.

1. System Drawings: Project-specific system drawings shall be provided for integration and on plans.

2. Simple reproduction of bid contract documents are never submittals. Wire CAD type and cable tag lists or schedules or typical manufacturer's abbreviated single lines alone, are not complete.

3. The AVC for this Section is responsible to initiate and coordinate with other trades in a timely fashion, on site. See suggested Responsibility Matrix on Technology plans. Include comments on shops for managing existing conditions and Division 26 coordination. AVC shall note his shops for unique means and methods that apply and existing conditions.

4. The AV Contractor shall submit the number of IP addresses, VLANS, and subnetworks that will be required from the Owner's Information Systems Department in advance.

    a. Integrate with (6) data drops in other Classroom technology sections between AV and technology room rack(s), as shown on other Section Technology plans.

5. Indicate field conditions for existing rooms and conduit paths verified by field inspection. Include coordination with the Division 26 scope of work for conduit entrances, stubs, pull boxes, wet boxes, and high work.

6. Note integration with other technology on the project bid documents, including scoreboard rack, video distribution, owner video production room (#N021D) and all page tie in infrastructure for future input. This may include HDMI interfaces, accessory product in floor boxes and racks, data drops from or to the building server, and video system tie in for cameras by others.

7. Note, watertight niche requirements and seals for this project. Note stainless metal items exposed to harsh conditions and confirm salt and spray needs on shops and during submittals on those items exposed to harsh environment. This includes but is not limited to AV plates, loudspeaker suspensions, and loudspeaker cabinets rated and protected for same.

8. Review mechanical and architectural plans for associated speaker locations, such as large ducts near loudspeaker suspension points on steel beams.

9. Shop drawings shall indicate confirmed physical plan locations. Include field coordination comments for adjacent scopes, placement of installed devices and all other integration and accessories for coordination. Provide mounting details, suspensions, and rough-in notes with trade demarcations.

10. Identify any non-standard back boxes or mounting assembly required by product or specifications. Note or elaborate contractor means and methods for mounting and tight niche or watertight conditions. Confirm rack entrance pull boxes and conduit entrance.

11. Provide a system block diagram noting all wiring for new system components and interconnection between components, including other racks. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (e.g., multiple identical controllers), the diagram may show one device and refer to the others as "typical" of the device shown.

12. Provide rack drawing(s) showing the mounting of equipment in each rack or cabinet on the project. Rack drawings shall include:

    a. Equipment placement including mounting on the front and rear as required.

    b. Portable AV rack for AV fantail and AC power cord management in wet areas. Note accessories for rack that manage cable tie downs, AC power cord length to nearest outlet and AV fantail sleeve managed.

    c. Cable separation required by equipment

    d. Confirm adequate and consistent airflow and heat dissipation.

    e. Review heating/cooling load and fan direction requirements for submitted equipment. For any Owner supplied AV gear, check fan direction if in new AV rack.

    f. Power requirements for each rack including plug type and sequenced or always on loads based on the final approved products. Note any 30-amp relays and circuits used and coordinate with Division 26.

    g. Fans mounted in quiet control room areas shall be selected for only high temperature settings for quiet operation.

    h. A console and/or equipment rack plan shall be provided showing console, countertop with cable drop slot, rough-in, cable paths, and wall plates with dimensions in plan and elevation view.

    i. The Contractor shall refer to the architectural drawings and specifications for room geometry, room dimensions and surface finishes. Plainly state EASE reference XYZ point used for shops for technician.

13. If an alternate loudspeaker design is approved and submitted other than Basis of Design, the Contractor shall submit the following sets of calculations for approval before installation with submittals: The Contractor shall submit packed electronic EASE files or an EASE generated list of materials and room data for review and approval by the Architect/Engineer.

    a. STI calculations for corridor loudspeakers with acoustic treatment per architectural plans and showing greater than STI 0.50.

    b. EASE Model and Calculations:

        1) All calculations shall be completed at a minimum patch size resolution of 1.00ft at 1/3 octave, 35ms split time, and shown with Summed Interference and Map with Shadow turned on. The calculations shall be submitted electronically as EASE OpenGL (*.egl) files.

        2) The Contractor shall also provide a copy of the latest version of the EASE GLL viewer to view the electronic EASE files and a summary plot in PDF for A.E review.

        3) Provide coverage maps (print or pdf), for each main loudspeaker and a combined composite of all main loudspeakers as Direct SPL in 3 octaves, (1000 Hz, 2000 Hz, 4000 Hz). Center frequency is mid-band sum center for 2000 Hz.

c. Articulation Loss of Consonants (ALCons) for seating area.

d. Calculated Speech Transmissible Index (STI) using the Modulation Transfer Index (MTI) with noise levels or equal for main seats.

e. The Contractor shall use the latest version of EASE.

f. The Contractor shall refer to the architectural drawings and specifications for room geometry, room dimensions and surface finishes. Plainly state reference XYZ point used for model no shops for technician.

g. The Contractor shall use a listener sitting height of four (4) feet for rooms where the primary function will be sitting. The Contractor shall utilize a listener standing height of five feet three inches (5.25') for rooms where the primary function will be standing.

h. The Contractor shall use a standard indoor temperature of 68°F, 60% humidity and a standard pressure of 29.8 Hg, unless more specific data is available.

14. All signal flow is preset, and gain staged in advance BEFORE Commissioning date. Note mixer preset on shops from bid document keynotes. Any audio overload only occurs at the input gain stage of the main amplifiers, alone.

15. Digital consoles are running approximately -18 on the house main fader for house nominal operation. All rear input trims or input preamps are set for all channel faders to be at fader "house zero nominal" operating level, no overload.

16. Provide rack drawing(s) showing the mounting of equipment in each rack or architectural cabinet.

17. Review architectural and electrical plans for finishes, furniture, acoustical treatments or acoustical drape, and the AC power for AV systems with cable management. Note conduit entrances, tie into other systems, and 30-amp receptacles if needed.

18. Review AV cable counts with conduit capacities. Interim pull boxes are not shown on plans and shall meet NEC code.

    1) Confirm video display scoreboard conduit path between AV rack and Scoreboard rack tie, (remote control and HDMI video feed).

    2) Confirm passthrough on common pull boxes for floor boxes including but not limited to underwater speaker system.

    3) Confirm AV cable separation requirements. No mic level cable is installed with speaker or power at any time. Indicate low voltage rack conduit for cable separation and rack entrances.

    4) Confirm conduit entrance and ties to other scopes and existing conditions, including but not limited to scoreboard, future video camera pathways, intercom/all page tie in. See Section 27 41 00 for added scope items.

19. Video displays and mounts shall be coordinated with the Architects drawings, existing conditions and other Technology plans. See ADA clearance requirements on Technology sheets.

20. Coordinate in-wall devices for stubs and terminal boxes for stud and masonry locations including recessed boxes, AV devices, mounts, and attachments. For existing conditions surface raceway is cautioned against, unless noted on plans.

    a. For existing rooms, coordinate locations and sleeves to tie systems together.

    b. The AV Contractor (AVC) for this Section is responsible to initiate and coordinate with other trades in a timely fashion on site. See Suggested Matrix and include comments on shops as required for existing conditions.

21. AVC shall note his shops for unique means and methods that apply for suspension and supplemental steel for safe overhead suspensions.

        1) See Precision Loudspeaker Aim Schedule. Note rotated cabinets or rotated horns in cabinets for aiming. Do not deviate for XYZ suspension points. Establish 0 reference point on shops. Review duct and architectural plans for this scope item, without fail.

        2) Main loudspeakers with mounts, screens, in-ceiling suspended microphones and other above ceiling low voltage devices shall be coordinated with other trades in the field in a timely fashion and with other trades (e.g., mechanical ductwork, fire sprinklers, lights, shades, curtains, credenza, diffusers, special acoustic tile etc.).

            a) Do not adjust main loudspeakers from aim schedule, without approval. Coordinate in advance.

            b) See Precision Aim Schedule. Note rotated cabinets or rotated horns in cabinets for aiming.

            c) Do not deviate for XYZ suspension points without written approval, outside of 1 foot approximate.

            d) Establish 0 reference point on shops. Review duct and architectural plans for this scope item, without fail.

            e) Confirm any fire sprinklers required nearby.

            f) Keep sightlines clear with both horizontal and vertical full angle of projected device, direct to seats and coverage zone perimeters.

        3) Minimize changes that will impact the performance of the specified system design and coordinate at project meetings on site as required in advance.

        4) Provide rigging and suspensions details and note PE rated suspensions and attachments with PE Engineer stamp or letter as noted in AV specifications and plans.

            a) Nonrated rigging and nonrated overhead suspensions are not specified and will not be approved. Use of Gripples or other non-rated suspension used for tensioning overhead devices are not recommended unless rated devices or are rated and a PE has reviewed this use at this site with letterhead or stamp.

b) Submit and confirm the detailed engineered and coordinated mounting solution(s) for wall-mounted and ceiling-mounted devices including the following items:

c) Main surface-mount and/or flown loudspeakers with rigging and PE rated hardware as noted herein.

d) Submit engineered PE stamped and rated rigging solution(s) for new or reused and reinstalled overhead suspended performance loudspeakers and other devices as noted on plans including, but not limited to, the following items:

e) Provide PE stamped shop drawings with PE rated suspension means and methods including rated loudspeaker rigging components, attachments, supplemental spans, and independent safety cables. Note load for each location and the independent safety cable used.

f) Review plans for supplemental steel supplied and coordinated by the AV Contractor and reviewed by the PE authority for speaker suspensions.

g) Clearly note and confirm the XYZ "reference" point being used on floor plans ("0" point) for determining proper aim, horn rotation, location, heights, and clearance of main speakers. Refer to the Loudspeaker Aim Schedule and confirm XYZ location and aim angle for each loudspeaker device. Verify clear sightline from speaker to aim point. Notify A/E of any anticipated conflicts.

5) No "big box" store, unrated, hardware for suspensions are used anywhere at any time.

22. Verification on site is needed for existing conditions required for reuse including existing raceway and boxes in an existing building. Coordinate in a timely fashion.

1) Indicate coordinated paths, homeruns, circulating cable, RCP backbox notes and rough in sizes and field notes for coordination.

2) Confirm cable in conduit and cable management at racks, new and if existing.

3) Verify and note outlet and floor box plates with lid types, color, inlay, including primary floor boxes from other Technology contractors. Detail suffix for finish or configuration that is compatible with floor plates.

4) Adjust floorplates inside floorbox for access opening and cables.

G. *Third Pass Software Shops:* The Contractor **shall** submit color graphic or emulated representations of the control system touch panels for each unique space and layout prior to purchase, installation and programming for review and comment by the Architect/Engineer and Owner. These shall show and describe the intended programming/macro control features and functions of each button/icon for all pages.

1. The Contractor **shall** submit the actual DSP audio processor files or single line audio path file diagram prior to installation for review and comment by the Architect/Engineer. Provide preliminary settings with processor blocks identified.

    a. AV Contractor shall provide a pdf of the DSP signal flow. Unique “app” files alone will be returned unless in pdf.

    b. At minimum and prior to installation and Commissioning, the DSP paths shall indicate:

        1) Name/label or nomenclature per AV specifications bid labels and AV risers for consistency. While numerical wire tags are allowed for cabling DSP, routing is named by function or location as noted on bid documents for users.

        2) Set all high pass filters (HPS) inserted in path file inputs with LED indicator for gain. Indicate a safe frequency for initial setting to protect the system. For all voice only paths, 225 Hz.is used for initial HPF settings before Commissioning date and for protection before warranty is in place.

        3) Indicate a single pathfile for all speech/talkers versus dual connector outputs (media) for main signal paths. These are separated DSP processing needs for EQ, level, compressors, and limiters.

            a) All talkers are always a separated mono single main buss whether combined to mono outputs or not.

            b) All media are always a dual main buss output inside the DSP until outputs are assigned for main system outputs and connectivity as noted on risers. Note the mono or dual path feeds on consoles and faders assigned and be consistent on shops.

        4) Indicate each gain stage or fader needed.

        5) Indicate gain overload indicator.

        6) Indicate DSP mixers and distribution with I/O or zoned functions.

        7) Indicate initial process blocks for parametric PEQ, limiters, levelers, protection limiter and low ratio compressors. Compressors are typically a 2:1 initial ratio setting. (1/3 octave ISO blocks are not recommended to conserve resources)

        8) Indicate delay blocks for all delay zones that are acoustically coupled to the site. Initial field delay time in feet or seconds is always entered as time of flight plus 10 milliseconds to begin and before Commissioning date, for all delays.

            a) For distributive delay zones with multiple speakers, choose a forward edge or leading loudspeaker for the time-of-flight reference.

        9) Name DSP distribution zones and outputs as functions and as noted on project plans.

10) Indicate anticipated % resources limits. Verify the resources available. If other non-approved DSP units are used with less resources, provide expanders.

2. Provide rack drawing(s) showing the mounting of equipment in each rack or cabinet on the project. Rack drawings shall include the following:

a. Equipment placement in front and if required the rear of the rack for conduit entrances and power coordination.

b. Spacing required by equipment for adequate airflow and heat dissipation. Note amplifiers may use a chimney effect with less vents between amplifiers when equals are used.

c. Review heating/cooling load and fan direction requirements for submitted equipment. This shall include Owner-provided equipment for fan direction.

d. Power requirements for each rack including plug type, sequence needs, power always on and confirmed loads based on the final approved products.

e. Indicate patch cable lengths and clearances on front face.

f. Indicate single blanks and vents.

3. A console or portable mixer plan shall be provided showing console, countertop, rough-in, cable paths, fantail and wall plates in plan and elevation view. The plan shall include equipment layout within the console and rack. Note any hangers or fantail support requirements. Digital consoles are running approximately -18 on the house main master fader, when all input trims or input preamps are setup for all channel faders. This is “house zero nominal” operating level to begin operation and training.

4. Submit and confirm the detailed mounting solution(s) for wall-mounted and ceiling-mounted devices including:

a. Main surface-mount and/or flown loudspeakers with rigging and PE rated hardware as noted herein with PE ratings.

b. Secondary speaker locations and static load with independent safety cable

H. Discontinued Products and New Model Updates/Running Line Changes:

1. For each product, the Contractor shall submit (in addition to the specified product) a product cut sheet if the specified product has been replaced, improved upon, phased out or otherwise upgraded at the time of shop drawing submittal.

a. The intent of this requirement is for the Contractor to submit only direct replacements for the specified products. A direct replacement shall be defined as a product of newer release that has equal or greater capabilities, which is available for not more than a 10% premium over the specified product’s bid unit cost.

b. It is not the intent of this requirement for the Contractor to submit new products or other product options that significantly differ in capability and/or cost from the specified product.

1.6 SYSTEM DESCRIPTION

A. This specification section describes the furnishing, installation, commissioning and programming of audio and AV components and systems that are coordinated for existing renovation and new spaces. Integrate to plans and specifications as required.

B. General Overview

1. Natatoriums: Professional AV system includes but is not limited to:

a. Dedicated software presets for simple operation using touch panels at AV rack, men and women's coach offices and as noted on plans.

b. Two sound reinforcement systems in Natatoriums with support areas

c. Media subwoofer for impact in new Natatorium

d. Commissioned performance and testing with A/E, with "Quiet Day" scheduled in advance. Precision audio testing is by a qualified AVC

e. Preparation for owner provided video production, (future).

f. Coordinate with Div. 26 for new video distribution and AV control, (See other Technology sections)

1) A video and camera feed from owner's video production headend is provided. Install feed for owner to tie his in-house video production (reference is Safari Montage system), at video room #N012D. Coordinate with PTZ camera cabling capability and deck located data drops for owner encoders and cameras as future functions.

2) Provide HDMI inputs and outputs with transceivers for a tie to new scoreboard rack, tested with continuity and verified at both ends.

3) Provide PTZ camera paths and boxes in new and existing natatorium, noted on TA series technology plans.

4) AVC and Division 26 shall include a conduit and cabling from the all-page or Classroom Intercom technology rack to the AV rack.

5) AV paths between existing natatorium (both audio and video ties) for selection of simultaneous programs in both natatoriums, controlled by remote touch panels and ready for owner video production.

g. Provide portable AV racks with wireless mic, announce mics and media used at scorer's table.

h. Underwater speaker zone.

i. Coordinate with a building page and intercom system that is running separately.

1) Page source will be a future page override capability by others with spare DSP input. Cable ready, no terminations.

2) Coordinate to accept future override. Feed is not fire alarm or security supervised. Expected signal is 25V, 70V speaker, or line and mic level for an owner supplementary page capability.

3) Provide spare DSP input in new AV rack for future page. Tag and label unterminated cable with loose connector ready. Preset DSP path file input with HPF for speech (300-8,000 Hz) and a DSP hard limiter with future override capability. Test for continuity and preset DSP.

4) Provide isolation transformer at new AV rack. Reference product is Jensen or RDL equal.

C. Provide system checkout and commissioning to be performed with A/E for acceptance. Commissioning shall begin with a list of the following minimums tested, reported with date.

1. The A/E for this Section provides a single, final punch list electro-acoustic and technical test for all loudspeakers and audio systems.

2. Test and report the following with readiness statement.

a. All loudspeakers are aimed and a continuity, polarity and impedance test is completed for each feed.

b. All main loudspeakers have been noise tested and a safe bandpass is preset for HPF and crossovers, without distortion. Refer to manufacturer's product data sheet for bandpass at - 3 and - 6 dB points to protect the loudspeaker prior to commissioning.

c. AVC shall provide 10-day written advance notice to the Prime Contractor and for the A/E to schedule the required and minimum of one "quiet day" on the project schedule chart for A/E electro-acoustic testing when loudspeakers are properly aimed and verified by advance testing.

d. A single punch list on behalf of the Owner is provided for final performance verification and optimization of the systems before first training date with the Owner.

e. A "quiet day" means other Contractor's activity may proceed in certain areas, but A/E shall retain the ability to call off any noise or intrusive construction activity in the main seating area for noise control measurement and main loudspeaker testing as A/E requires. This is at the will of the site acoustician and AV Commissioning firm (A/E) and AV Contractor shall coordinate this date before final owner training is selected.

3. A test report and pre-commissioning check list shall be filed by AVC ***prior*** to scheduling A/E performance verification on site. Report shall confirm:

a. All AV wire for this section is installed, tested and 90% confirmed in operation.

1) All products are installed, tested and confirmed, unless listed as backordered or not on site with the report.

2) All shop drawings are approved, including later pass DSP path file with presets and any touch panel layout shops.

3) All loudspeakers have been aimed and tested for coverage with a calibrated mic for the primary seating coverage areas. This occurs individually for each zone.

4) All main loudspeakers have been tested with pink noise, crossovers are preset, system is gain staged for safety, and talker as well as noise testing is completed for Commissioning.

5) A “Quiet Day” has been scheduled for final testing for a full day, at minimum.

D. The AVC shall include a site audio test allowance in his/her bid for A/E Commissioning and testing services of ***$2,850,*** assigned by the A/E for site tests with the AVC for two days on site. Include this amount in the AVC bid for all AV work in this Section.

E. Performance Statement: This specification section and the accompanying Contract Documents are describing the minimum material quality, required features, and operational requirements of the system. The Basis of Design is the reference product for design and approved equals are stated.

F. These documents do not convey every wire that must be installed, every equipment connection that must be made and every feature and function that must be programmed and configured. Based on the equipment constraints described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

G. This document describes the major components of the system. All additional hardware, subassemblies, supporting equipment and other miscellaneous equipment required for proper system installation and operation shall be provided by the Contractor.

H. This document describes the major programming features and functions of the system. All additional programming, configuration and integration required for proper system installation and operation shall be provided by the Contractor.

I. When a specific manufacturer is not provided in this document for minor pieces of equipment, the qualified AV Contractor (AVC) shall provide only those materials considered to be of the same industry commercial and professional quality level as the major equipment manufacturers.

1.7 INTELLECTUAL PROPERTY OWNERSHIP

A. All supporting documentation, programming, uncompiled source code, graphic files, DSP code and diagrams, written and electronic files, including all latest versions of the documentation and software necessary to edit and adapt the system(s), shall be provided to the Owner for all spaces and all systems. The integrator and/or programmer shall also maintain a current copy to be provided at the Owner’s request.

1. The Owner shall have the right to modify the intellectual property directly, or to have the intellectual property modified by any party of the Owner’s choosing.

2. The installed system is supported by warranty and password protection, by the AV Contractor as noted in the project documents.

1.8 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of other Division 27 Sections, including Section 27 05 00.

B. Provide all applicable certifications.

C. Provide statement that system checkout test, as outlined in the shop drawing submittal, is complete and satisfactory.

D. Provide schedules documenting all terminal block wiring, including cable numbers.

E. Warranty: Submit written warranty and complete all Owner registration forms.

F. Complete all operation and maintenance manuals as described below.

G. The Contractor shall include all factory-provided test results for equipment installed on the project.

H. The Contractor shall include all test results from system demonstration and performance testing specified in this document.

I. Record Drawings shall minimally include:

1. All revisions to, or deviations from the original drawings, as well as final dimensions, cable routes, connector panel drawings, cable numbering charts, and control system programming documentation. A complete as-installed equipment list, listed by room, and with manufacturers' names, model numbers, serial numbers, and quantities of each item.

2. A complete and correct system schematic, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and programming code.

3. Complete equipment rack layouts showing locations of all rack-mounted equipment items.

4. Additional information, diagrams or explanations as designated under respective equipment or systems specification section.

J. Within each equipment room, the appropriate floor plan for which that equipment room serves shall be laminated and mounted for use by the Owner. Functional drawings shall be posted at each AV closet or included at every AV rack within a room.

K. Upon completion and final acceptance of the project, the Contractor shall provide the Owner a copy of the programming code for all AV systems and devices programmed by the Contractor.

1. For any subsequent modifications to the programming code, an updated copy of the code shall be provided to the Owner.

1.9 USER OPERATION AND MAINTENANCE DATA

A. Submit documents under the provisions of Section 27 05 00 and this Section.

B. Manuals: Final copies of the manuals shall be delivered after completing the installation. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of the Contractor responsible for the installation and maintenance of the system and the factory representatives for each item of equipment for each system. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation shall include all modifications made during installation, checkout, and acceptance. Manuals shall be submitted in electronic

format and shall be collated in a logical fashion, not simply “stacked” pdfs. The manuals shall consist of the following:

1. Functional Design Manual: The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included.

2. Hardware Manual: The manual shall describe all equipment furnished including:

    a. General description and specifications.
    b. Installation and checkout procedures.
    c. Equipment layout and electrical schematics to the component level.
    d. System layout drawings and schematics.
    e. Alignment and calibration procedures.
    f. Manufacturers repair parts list indicating sources of supply.

3. Software Manual: The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:

    a. Definition of terms and functions.
    b. System use and application software.
    c. Initializations, startup, and shutdown.
    d. Reports generation.
    e. Details on forms customization and field parameters.

4. Operator’s Manual: The operator’s manual shall fully explain all procedures and instructions for the operation of the system including:

    a. Computers and peripherals.
    b. System startup and shutdown procedures.
    c. Use of system, command, and applications software.
    d. Recovery and restart procedures.
    e. Use of report generator and generation of reports.
    f. Data entry.
    g. Operator commands.
    h. Alarm messages and reprinting formats.
    i. System permissions functions and requirements.

5. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.

C. Video Calibration Data: Provide documentation of all calibrated settings for each projector and display if video is specified in this section.

D. Audio Calibration Data: Provide documentation on all EQ settings, crossover points, limiter settings, gate settings and all other applicable settings.

E. Intellectual Property Ownership: Provide all uncompiled source code and DSP programming for all systems and spaces as described in Part 3 of this specification section.

1.10 WARRANTY

A. Unless otherwise noted, provide warranty for one (1) year after Date of Substantial Completion for all materials and labor.

B. Reused or owner items are not under new warranty.

C. Onsite Work During Warranty Period: This work shall be included in the Contractor's bid and performed during regular working hours, Monday through Friday.

1. Inspections: The Contractor shall perform two (2) inspections of the finished system during the first 12 months after project finish, the first within 4 months and the second within 10 months.

2. Provide:

a. Visual checks and operational test of all equipment, field hardware, and electrical and mechanical controls in full operation.

b. Mechanical adjustments if required on any mechanical or electromechanical devices that are not functioning or as noted by the owner.

c. Clean any air filters and rack surfaces in need.

d. Observe and perform diagnostics on operating equipment, including overloads and gain staging.

e. Check, test, and calibrate (if required) any sensors or other equipment that contain settings.

f. Run all system software diagnostics and correct all diagnosed problems on software and DSP for controllers.

g. Talk test all audio systems and playback media for each local system.

D. Operation: Upon the performance of any scheduled adjustments or repairs, Contractor shall verify operation of the systems.

E. Emergency Service: The Owner will initiate service calls when the systems are not functioning properly. Qualified personnel shall be available to provide service within the distance defined within this specification section. The Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365. Service personnel shall respond within 24 hours after receiving a request for service and cite dates and time and next steps for service.

F. Records and Logs: The Contractor shall keep records and logs of each task completed under warranty. The log shall contain all initial settings at substantial completion. Complete logs shall be kept and shall be available for review on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the systems.

G. Work Requests: The Contractor shall separately record each service call request on a service request form. The form shall include the model and serial number identifying the component involved, its location, date, and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing what must be done, the amount and nature of the materials used, the time and date work started, and the time and date of completion. The Contractor shall deliver a record of the work performed within ten (10) business days after work is accomplished.

H. System Modifications: The Contractor shall make any recommendations for system modification in writing to the Owner. No system modifications shall be made without prior approval of the Owner. Any modifications made to the system shall be incorporated into the operations and maintenance manuals, and other documentation affected. To the fullest

extent possible, the Owner shall be provided with electronic restorable versions of all configurations prior to the modifications being made.

I. Software: The Contractor shall provide all software and firmware updates during the period of the warranty and verify operation of the system upon installation. These updates shall be accomplished in a timely manner, fully coordinated with system operators, shall include training for the new changes/features, and shall be incorporated into the operations and maintenance manuals, and software documentation.

J. Refer to the individual product sections for further warranty requirements of individual system components.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

A. Refer to the project drawings for Basis of Design and system components. Equivalent products shall meet or exceed all requirements defined on the project drawings. The following product information represents the minimum additional requirements for equivalent products if any.

B. Portable equipment:

1. Provide additional portable equipment as follows:

a. Provide two (2 qty) Shure SM-58 Beta handheld mics with six (6 qty) 25-foot cables for mic and portable cases.

b. Provide two (2 qty) Atlas #MS 12CE heavy duty mic stands, equal by KM.

c. Provide two (2 qty) sleeved AV fantails for portable AV racks at scoring location plate. Size AC and AV cable lengths for scoring location to AC outlet and AV plate. See Schedule, plans and riser.

d. Provide two (2 qty) wireless mic windscreen/pop filters.

C. AV system equipment racks: Refer to technology equipment schedule. Racks are dead front construction. Coordinate wall space for cable entrance, noting rack depth, AC power sequence and ventilation requirements as required. Provide cable access/entrance with junction/pullboxes that recognize cable separation requirements and rear workspace requirements. Coordinate rack height. Verify available space as part of Audio Contractor scope of work. Provide accessories as noted:

1. Main AV equipment rack:

a. MAP #LBP-1.5 lacer bars for all cable management within each (reused) rack.

b. Add rear rack rail option to existing for cable routing/management/separation.

c. Provide vent panels and vent top as required for thermal management.

d. Provide blank plates for dead front rack, 1u height each.

e. Coordinate with plan/elevations and existing conditions, including new access point to house mix position.

2. Modular AC power raceway: See riser. Provide sequential AC power by Middle Atlantic for main equipment rack with remote feature as momentary dry contact activations and 12-volt dc power. Main system power shall be controlled from control system touch panel with backup switch at amplifier rack for all AC power sequence and clearly labeled as Master. See drawings for always on circuits identified for control system. Review AC power loads and surges of amplifiers for power circuits. Review 30-amp circuits if required. Coordinate and verify unipoint ground with dedicated circuit and isolation washers as needed.

   a. Provide MAP #USC-6R six step remote sequencing controller with label.

   b. Provide main AV rack AV-ER-1 with (1 qty) MAP #MPR-8A raceway chassis and modules:

      1) MAP #RLM-20A raceway remote module, 20A.

      2) RLM-20A-SP raceway remote module with series mode surge protection for DSP, control system and digital mixer headend.

      3) MAP #M-2X20 basic modules AC outlets

      4) Provide tails, MAP #T-(x) and jumpers MAP J- (x) as required for inter-rack connections.

      5) Provide AC module blank required per NEC code.

      6) Coordinate with Risers on plans.

3. Provide MAP #SLIM series vertical power strip at each rack, quantity as required for additional outlets.

D. Audio/Video GUI Control Systems:

1. Contractor shall furnish a programmable software-based audio/video control system. The system shall be field configurable and programmable by the factory and/or a factory-trained programmer.

2. The control system shall be TCP/IP based allowing direct connection of the system processors to a 10/100BaseT compatible Ethernet network.

3. Refer to project drawings for required central processors, touch panels, keypads, and additional information.

E. Microphone Systems:

1. Wireless Microphones: Both a simple preset and stage production, with capability for adding rental systems by others.

2. Review existing microphones in other rooms with other manufacturer systems in use nearby.

   a. Wireless microphones shall not operate in the 614 to 806 MHz band (channels 38 to 69).

   b. Microphone systems that are common (shared) by multiple spaces or when the receivers are in a remote area shall include a compatible wireless antenna distribution system by the same manufacturer as the wireless microphone system.

3. Provide Shure #UL Series wireless microphones with rechargeable batteries and battery charger to meet quantity of wireless on drawings. Verify frequency band for geographic location and rack mount units. Extend antenna outside of rack.

   a. Provide Countryman "Earset" ear clips two-ear support for each Countryman headset mic.

   b. Provide one (1) quantity Shure #SB900 Rechargeable battery for each wireless microphone, plus provide two (2) spare batteries.

   c. Provide one (1 qty) Shure SBC10-100 single battery recharging station with power supply.

   d. Provide two (2 qty) Shure #SBC800 8-up docking recharging station with power supply.

   e. Provide antenna cable extension, plate and antenna, per plans.

F. Audio Amplifiers:

1. Power Amplifier(s), 25, 70.7 and 100 Volt:

   a. Power: The following calculation shall be used to determine the minimum required output of a distribution type amplifier(s):

      1) Calculate the total power tap value of each transformer with insertion loss using the following equation:

         a) Tap wattage x 10^(xdB/10) where x = the rated insertion loss at 1,000Hz.

      2) Calculate the total wattage loss based on cable distance, cable gauge and cable resistance.

      3) Add together all the speaker taps' total power values that will be on a single channel of the amplifier. Multiply that total by 1.2 which will allow for a 20% future expansion. Multiply that number by 1.25 to ensure the amplifier never exceeds 75% of its total output.

      4) Final number confirms minimum amplifier power requirements

      5) Provide added power for headroom extension as note on Schedule.

G. Assisted Listening Systems (ALS): assistive listen system.

1. Assisted listening requirements for this project shall follow the local jurisdiction's requirements to quantify the number of devices for use on this project.

2. Coordinate coax antennae. Extend outside of racks.

H. Power Conditioning and Surge Protective Devices:

1. All equipment shall be plugged in through a power conditioning surge arrestor.

2. Provide a minimum of 50 dB noise attenuation.

3. Provide a minimum of 1,500 joules of surge protection.

4. UL 1449 – Standard for Safety for Surge Protective Devices listed to 330 volt clamping voltage.

5. Power sequencers shall be equipped with contact closures, bi-directional RS-232 or Ethernet control for remote turn on and off.

6. Refer to the project drawings for additional information with new clean power by Division 26.

I. Audio Unbalanced to Balanced Converters, Balanced to Unbalanced Converters, Combiners, Dividers, Isolation Transformers, and Line Drivers Minimum Requirements:

1. Unbalanced to Balanced Active Converter:

a. Provide signal isolation from the audio signals of differing channels.

b. Provide output trim gain and set to optimal output level while preventing over amplification and clipping of the signal.

c. Minimum frequency response of 20 Hz to 20 kHz (± 0.5dB).

d. Provide with appropriate power supply and mounting kit for rack or wall use.

e. Provide appropriate converter for mono to mono, mono to stereo, stereo to stereo, or stereo to mono to match the input of the equipment to which it is being connected.

2. Balanced to Unbalanced Passive Converter:

a. Provide transformer isolation from the input to output.

b. Provide output trim attenuation and set to optimal output level while preventing over-amplification and clipping of the signal.

c. Minimum frequency response of 20 Hz to 20 kHz (± 0.5dB).

d. Provide with appropriate mounting kit for rack or wall use.

e. Provide appropriate converter for mono to mono, mono to stereo, stereo to stereo, or stereo to mono to match the input of the equipment to which it is being connected.

3. Stereo to Mono and Mono to Stereo Passive Combiner/Divider:

a. Passive resistive network.

b. Provide RF filtering.

c. Provide a minimum of 3dB of isolation between channels.

d. Provide no greater than 3dB of Insertion Loss.

e. Minimum frequency response of 20 Hz to 20 kHz (± 3dB).

f. Provide with appropriate mounting kit for rack or wall use.

g. Provide appropriate passive combiner for low impedance or high impedance and balanced or unbalanced signals to maintain the original signal type.

4. Passive Isolation Transformers:

a. Provide Galvanic Isolation.

b. Minimum frequency response of 20 Hz to 20 kHz (± 3dB).

c. Isolate the input shield from the output shield. Input shield is electrically isolated from the transformer chassis and provides a ground return. The output shield is connected to the transformer chassis.

d. Provide with appropriate mounting kit for rack or wall use.

e. Provide appropriate isolation transformer for low impedance or high impedance, stereo or mono signals, and balanced or unbalanced signals to maintain the original signal type.

5. Active Signal Line Driver:

a. Provide balanced or unbalanced inputs with balanced outputs.

b. Provide input trim gain for a minimum of unity gain from -14dBu to +24dBu, set to optimal output level while preventing over-amplification and clipping of the signal.

c. Provide a minimum balanced output of +4dBu nominal for a minimum output gain of +25dBu.

d. Minimum frequency response of 20 Hz to 20 kHz (± 0.5dB).

e. Provide with appropriate power supply and mounting kit for rack or wall use.

f. Provide appropriate line driver for low impedance or high impedance and stereo or mono signals.

J. Refer to project drawings for all other equipment not listed.

2.2 AUDIO CONNECTORS

A. Specifications include minimum requirements for all connectors that are acceptable on this project. Should the Contractor request alternative connectors, it shall be submitted with product submittals.

B. Phono Jack:

1. Panel Mount:

a. Professional grade, three conductor, stereo, 0.375" hole diameter mounting, self-locking, double-open circuit.

b. Basis of Design Manufacturer:

1) Neutrik

2. Cable Mount:

a. Professional grade, three conductor, stereo, all-metal construction, integral cable clamp, nickel body, cable strain relief.

b. Basis of Design Manufacturer:

1) Neutrik

C. Phono Plug:

1. Professional grade, 1/4" stereo phone plug, strain relief, internal cable clamp, all metal body, tin-plated solder terminals.

2. Basis of Design Manufacturer:

a. Neutrik

D. XLR Jack:

1. Panel Mount: Professional grade, crimped insert for vibration control, nickel shell, silver pins, pin quantity as required for application.

2. Basis of Design Manufacturer:

a. Neutrik

E. XLR Plug:

1. Professional grade, 360° strain relief, nickel shell, silver pins. Provide colored boot.

2. Basis of Design Manufacturer:

a. Neutrik

F. Loudspeaker Connector:

1. Panel Mount: Twist-lock type, 4-conductor.

2. Basis of Design Manufacturer:

a. Neutrik SpeakOn

G. Shielded Category 6 Connector:

1. Panel mount:

2. Basis of Design Manufacturer:

a. Neutrik Ethercon

2.3 AUDIO CABLING

A. Refer to Section 27 05 00 for ratings.

B. Microphone and Line Level Audio Cabling:

1. For patch cables less than or equal to 25 feet:

a. 22 AWG 2-conductor, twisted, stranded (7x30) tinned bare copper.

b. Single Layer Shield:

1) Shield: 100% aluminum foil shield

c. Nominal Capacitance for non-plenum cable: 24.0pF/Ft

d. Nominal Capacitance for plenum cable: 35.0 pF/Ft

e. Acceptable Manufacturers:

1) Belden
2) West Penn
3) Liberty

2. For cable runs greater than or equal to 25 feet:

a. 18 AWG 2-conductor, twisted, stranded (16x30) tinned bare copper.

b. Single Layer Shield:

1) Shield: 100% aluminum foil shield

c. Acceptable Manufacturers:

1) Belden
2) West Penn
3) Liberty

C. Constant Voltage Speaker Cabling:

1. Class 2, stranded, twisted, 2-conductor, minimum of 16-gauge wire for all 25/70.7/100-volt applications unless noted otherwise.

2. The Contractor shall size cabling as required for distance power and shall provide larger gauge cable as required.

3. Acceptable Manufacturers:

a. Belden
b. West Penn
c. Or pre-approved equal

D. High Performance Low Capacitance Speaker/Subwoofer Cabling:

1. Class 2, high strand count (259x34), oxygen free copper, low capacitance (23.2 pF/Ft), twisted, 2-conductor, 12-gauge wire for all 4/8-ohm low impedance applications where amplifier output is 150 watts or greater and/or the distance is greater than 50', unless noted otherwise.

a. Provide dual runs of 14-guage wire (11 AWG equivalent) for main speakers.

2. The Contractor shall size cabling as required for distance power and shall provide larger gauge cable as required.

3. Cable shall be installed in conduit within plenum areas.

4. Acceptable Manufacturers:

   a. Belden
   b. West Penn
   c. Or pre-approved equal

2.4 TRANSMISSION CONNECTORS

A. BNC Bulkhead:

1. Chassis Mount: 50 ohm, feed-through jack-to-jack type
2. Recessed: 50 ohm, nickel face, feed-through jack-to-jack type

B. BNC Connector:

1. 50 ohm, RF broadcast quality, two-piece compression or crimp type. Return Loss: < -36 dB to 1 GHz, -25 dB to 2 GHz, -23 dB to 3 GHz. Twist-on and connectors are not acceptable.

2. Approved Manufacturers:

   a. Corning Gilbert
   b. King
   c. Amphenol

2.5 TRANSMISSION CABLING

A. For patch cables less than or equal to 25 feet:

1. RG-174, center conductor: 26 AWG stranded (7x34) copper-covered steel; 0.019" OD (nominal); polyethylene insulation.

2. Single Layer Shield:

   a. Outer Shield: 90% tinned copper braid shield

3. Nominal Impedance: 50 ohms

4. Nominal Capacitance: 30.8 pF/Ft

5. Velocity of Propagation: 66%

6. Maximum Attenuation (per 100 feet):

   a. at 1-MHz: 1.9 dB
   b. at 50-MHz: 5.8 dB
   c. at 400-MHz: 19.0 dB
   d. at 700-MHz: 27.0 dB
   e. at 1000-MHz: 34.0 dB

7. Cable shall be installed in conduit within plenum areas.

8. Acceptable Manufacturers:

    a. Belden
    b. CommScope
    c. Liberty
    d. Times Fiber

B. For horizontal cables less than or equal to 50 feet:

1. RG-58, center conductor: 20 AWG bare solid copper; 0.037" OD (nominal); polyethylene insulation for non-plenum and FEP Teflon dielectric for plenum.

2. Single Layer Shield:

    a. Outer Shield: 95% tinned copper braid shield

3. Nominal Impedance: 50 ohms

4. Nominal Capacitance for non-plenum cable: 28.5 pF/Ft

5. Nominal Capacitance for plenum cable: 26.4 pF/Ft

6. Velocity of Propagation for non-plenum cable: 66%

7. Velocity of Propagation for plenum cable: 69.5%

8. Maximum attenuation for non-plenum cable (per 100 feet):

    a. at 1-MHz: 0.3 dB
    b. at 50-MHz: 2.5 dB
    c. at 400-MHz: 8.4 dB
    d. at 700-MHz: 11.7 dB
    e. at 1000-MHz: 14.5 dB

9. Maximum attenuation for plenum cable (per 100 feet):

    a. at 1-MHz: 0.5 dB
    b. at 50-MHz: 3.0 dB
    c. at 400-MHz: 9.7 dB
    d. at 700-MHz: 13.7 dB
    e. at 1000-MHz: 17.3 dB

10. Acceptable Manufacturers:

    a. Belden non-plenum or plenum
    b. CommScope
    c. Liberty
    d. Times Fiber

C. For horizontal cables greater than or equal to 50 feet:

1. RG-8 center conductor: 10 AWG bare solid copper; 0.108" OD (nominal); foam HDPE insulation for non-plenum and foam FEP dielectric for plenum.

2. Two Layer Shield:

    a. Inner Shield: non-bonded aluminum foil tape
    b. Outer Shield: 90% tinned copper braid shield

3. Nominal Impedance: 50 ohms

4. Nominal Capacitance for non-plenum cable: 24.8 pF/Ft

5. Nominal Capacitance for plenum cable: 24.2 pF/Ft

6. Velocity of Propagation for non-plenum cable: 82%

7. Velocity of Propagation for plenum cable: 84%

8. Maximum attenuation for non-plenum cable (per 100 feet):

   a. at 1-MHz: 0.4 dB
   b. at 50-MHz: 1.0 dB
   c. at 400-MHz: 2.6 dB
   d. at 700-MHz: 3.6 dB
   e. at 1000-MHz: 4.4 dB
   f. at 4000-MHz: 9.9 dB

9. Maximum attenuation for plenum cable (per 100 feet):

   a. at 1-MHz: 0.1 dB
   b. at 50-MHz: 1.1 dB
   c. at 400-MHz: 3.2 dB
   d. at 700-MHz: 4.5 dB
   e. at 1000-MHz: 5.9 dB
   f. at 4000-MHz: 14.1 dB

10. Acceptable Manufacturers:

    a. Belden non-plenum or plenum
    b. CommScope
    c. Liberty
    d. Times Fiber

2.6 CONTROL CABLING

A. Control:

1. For Bidding Purposes: Two-pair, twisted, shielded, one (1) #18 AWG pair and one (1) #22 AWG pair. Provide with plenum-rated jacket where used in a plenum space without conduit.

2. Size conductors as required for distance and voltage drop.

3. Coordinate exact requirements with selected manufacturer and system prior to submitting bid.

B. Other Control Circuits:

1. #20 AWG, stranded, shielded cable, number of conductors as required for the applications. Provide with plenum-rated jacket where used in a plenum space without conduit. Provide PVC jacket where installed in conduit or non-plenum areas.

2. Coordinate exact requirements with selected manufacturers prior to submitting bid.

2.7 HORIZONTAL COPPER DATA AND FIBER CABLING AND CONNECTORS

A. Refer to Section 27 15 13 – Communications Copper Horizontal Cabling for requirements.

B. All category-rated copper data cabling and fiber optic cabling shall be installed, terminated, tested and certified by a qualified Telecommunications contractor certified by the selected manufacturers for the copper and fiber optic cabling plant. The Contractor shall submit all cabling and certifications to the Architect/Engineer for approval in the shop drawings.

C. The A/V contractor shall coordinate purchase, installation, testing and certification for all required category-rated copper data cabling and fiber optic cabling required for A/V system operation prior to bid.

PART 3 - EXECUTION

3.1 EXAMINATION OF SITE

A. Verify that surfaces are ready to receive work.

B. Verify conditions for existing, demo or reuse

C. Verify field dimensions and coordinate physical size of all equipment with the architectural requirements of the spaces where they are installed. Allow space for adequate ventilation and circulation of air. Verify access and clear sightlines for video lens, speakers and antennae.

D. Beginning of installation means installer accepts existing conditions and has coordinated on site with other trades as required.

3.2 PRE-INSTALLATION

A. A pre-installation meeting shall be coordinated for rough-in after project award before any submittals or work has been conducted.

B. Meeting shall review drawings and specifications to begin coordination, on site.

1. Meeting will include the IMEG Engineer, Architect, and relevant installing GC and EC contractors for this system.

2. AVC shall have walked site prior to meeting.

C. The AV Contractor shall review his work and proceed to submittals in a timely fashion with shops, prior to any purchasing, installation, programming, and construction coordination.

3.3 INSTALLATION

A. Comply with the manufacturer's instructions and recommendations for installation of all products.

B. Provide all system wiring between all components as directed by the manufacturer or required for proper system operation. Prepare spare cables.

C. Mount all touch screen devices where shown on plans in accordance with Americans with Disabilities Act (ADA) requirements for both side reach and front reach.

D. Cabling Requirements:

1. See stipulation in other Sections, including Section 27 05 00 for Common Work.

2. Non-plenum rated cabling may be used instead of plenum only when installed within conduit in plenum rated areas for the length of the cable.

3. All cabling shall be routed and separated according to function. Cabling shall be grouped and bundled by groups, such as: microphone and line level audio, control, video and speaker. In no case shall cabling from different functional groups be intermixed. No cabling shall be routed parallel to 120 VAC or higher power circuits unless separated by a minimum of 6" and the 120 VAC or higher power is installed in conduit.

4. When cabling is installed in conduit, a separate conduit shall be provided for each cabling functional type or as noted on plans. Do not combine rack entrance cables in one common entrance. Never mix microphone level with any other cable groups. Separate video from speaker level audio. AC power is never run with AV cable.

5. Cable bundles shall be loosely bundled to allow the visual following of individual cables within the bundle and to permit the easy removal and addition of cables as necessary.

6. Horizontal cabling installed as open cable or in cable tray shall be bundled at not less than 10’ intervals with hook-and-loop tie wraps. The use of plastic cable zip ties is prohibited.

7. Cabling shall not be spliced under any circumstances, without a box, label on each end and a cover plate and terminal such as a screw strip with barriers. Verify shielding and grounding needs.

8. Each cable shall be appropriately identified (defined for record documents) at each end’s termination point using pressure sensitive label strips.

9. Audio Cabling:

   a. All amplified audio cabling shall not be in the same enclosed pathway as any other type of cabling as required by the NEC. Refer to the NEC for definitions and additional requirements.

   b. The polarity of all cabling shall remain consistent throughout the project, on all equipment. Red conductors shall be used for the positive "+" side, and black used for the negative "-" side.

   c. Cable shield length shall be equal to the cable’s conductor length.

   d. All shielded cables drain wire SHALL be grounded and continuous throughout the entire length of the system, including splices where speakers are installed.

   e. Balanced audio connections shall be used whenever the mating equipment allows.

   f. Do not run unbalanced cables longer than 3m or outside of racks. For interconnecting of unbalanced equipment in lengths longer than 3m, the Contractor shall provide a line driver located at the source.

10. Twisted Pair Cabling for All Applications:

    a. The Contractor shall ensure that the twists in each cable pair are preserved to within 0.5 inch of the termination. The cable jacket shall be removed only to the extent required to make the termination.

    b. The Contractor shall ensure that the cable shields are continuous throughout, terminated, and grounded according to the manufacturer's recommendations.

E. Grounding Requirements:

1. Provide a minimum of #6 AWG conductor from the nearest electrical service ground bus or nearest telecommunications room ground bus bar to the A/V equipment racks and cabinets regardless of location. Size cable as required by the NEC.

2. Cables containing shields shall not have the shields grounded at conduits, boxes, racks, etc. Ground the shield only at the equipment end.

3. Audio cable shields for line-level signals shall be connected to the metal equipment chassis at both ends of the cable.

4. Audio cables connected to transformers shall have the cable shield connected to the transformer shield and transformer case ground. For speakers subject to lightning on poles or stadia, and underwater feed locations, provide transformer isolation and watertight seals. Isolation transformers are required for wet and high areas, not autoformers.

5. The Contractor shall not connect cable shields together from differing cables.

6. XLR cable shields shall be connected to chassis ground.

7. Signal-grounded balanced shields are not acceptable and shall not be installed. All balanced shields shall be chassis grounded.

F. Rack and Cabinet Requirements:

1. Ground equipment racks/cabinets as noted within this specification section.

2. Provide one (1) RU of space between adjacent pieces of equipment with top and/or bottom vents, above the topmost piece of equipment, and below the bottommost piece of equipment. Provide a vented cover panel covering each rack space.

3. Terminate all speaker cabling on individual barrier strips for positive "+", negative "-", and shield. The shield barrier strip shall be grounded.

4. Provide a power conditioning surge arrestor in the rack for distribution of AC power from the wall receptacles indicated on the plans. The quantity of plugs shall be adequate so that no equipment in the rack shall require plugging into an AC source outside the rack.

5. Power sequencing shall be provided in the racks where shown on the drawings. All amplifiers located in the racks shall be sequenced "last on – first off". Power sequencers shall provide power conditioning and surge protection.

G. Audio System Installation Requirements:

1. The Contractor shall perform calculations for the optimal 70V. field speaker tap settings to reach the desired SPL level and coverage without overloading the amplifier(s).

    a. For new systems, the following best practices are referenced:

        1) Add together all speaker taps that will be on a single channel of the amplifier. Multiply that total by 1.2 which will allow for a 20% future expansion. Multiply that number by 1.25 to ensure the amplifier never exceeds 75% of its total output. Utilize the final number to confirm the minimum amplifier power requirements.

        2) For direct coupled systems (low impedance), allow a minimum of 12 dB headroom before any distortion occurs at the amplifier input indicator when beginning gain stage tests are set up.

            a) Increase headroom as appropriate for high impact and clarity needs, typically exceeding 12 to 15 dB during continuous operation.

            b) Any overdriven indicator shall ONLY be at the input attenuator of the power amplifier, first.

            c) No other overloads shall occur when an overload is indicated at this point, including:

                (1) House output Level on the Mixer

                (2) DSP I/O, at unity gain.

2. Connections of balanced to unbalanced equipment shall only be done through an active converter at the unbalanced side.

3. Connections of unbalanced to balanced equipment shall only be done through an active converter at the unbalanced side.

4. Connections from stereo balanced or unbalanced equipment to mono equipment of the same signal type shall only be done through a passive combiner.

5. Connections from mono balanced or unbalanced equipment to stereo equipment of the same signal type shall only be done through a passive divider.

6. The Contractor shall provide an isolation transformer for any balanced or unbalanced audio line that exhibits a hum, noise from EMI or RFI, power line noise, or ground loops.

7. The Contractor shall provide an active audio line driver for all balanced and unbalanced signals that exceed the distance limitations of the cabling.

H. Control System Installation Requirements:

1. The Contractor shall perform calculations for the required wire AWG size based on distance for system power for touch panels, keypads and other devices being powered. A minimum of a 15% overhead is required.

3.4 AUDIO SYSTEM TESTING AND CALIBRATION:

A. A calibrated microphone is required for all tests and which must be calibrated before testing.

B. This Contractor shall field adjust any surface-mounted or flown loudspeaker orientation to achieve the necessary coverage pattern to the intended listening plane. Loudspeakers always face listeners and minimize coverage on walls.

C. The contractor shall be familiar with the named and specified nominal coverage angle of all speakers above typical crossover points for speech range, (500-8,000 Hz).

1. Establish field reference point per Aim Schedule.

2. Verify speaker horizontal and vertical coverage with manufacturers data sheet.

3. Confirm cabinet rotation pattern before installation.

4. Confirm aim and coverage zones for main voice signal path, as opposed to stereo media path files in side software DSP.

5. Verify passive and bi-amp settings per design.

6. Polarity check required of all speakers prior to hang, on the ground.

D. All speakers shall be tested for polarity prior to high work and a table of test results shall be included for A/E inspection. All loudspeakers shall be connected with uniform polarity, where a positive pressure pulse at the input corresponds to a positive driver excursion, and all drivers are uniform always moving in the same direction. Main speakers shall not be lifted or hoisted into high access areas without polarity testing.

E. The Contractor shall make incremental adjustments on the equipment output and input tolerances to achieve matching signal levels while preserving +10 dB minimum headroom and also unity gain. Insert all broadband or high pass filters first for system protection after review of manufacturers specifications for power and bandpass.

F. The Contractor shall utilize a Real Time Audio (RTA) spectrum analyzer with AES2 Broadband pink noise at a minimum of 1/3 octave, capable of providing detailed plots and reports.

1. The Contractor shall have and own a calibrated Type 1 or Type 1.5 microphone for all measurements, that is recently calibrated within the last year.

2. Calibration by ear, tablets and portable phones with integrated microphones are never acceptable. All software analysis tools require a calibrated interface and calibrated microphone. No Android devices are used for metering or calibration. IOS devices with calibrated software and interfaces may be used.

G. Provide high quality media with full bandpass program material for critical listening. MP3 or streaming audio is not preferred acceptable unless lossy formats are known and rated. Phone apps are not adequate with out high quality interface and outputs.

H. Testing shall illustrate WAV file or limited compression quality playback for impact and clarity. Phones and apps are not accepted.

I. Test signal shall be 10dB minimum above all ambient noise levels during all testing.

J. The Contractor shall use a listener sitting height of four (4) feet ± 1" for rooms where the primary function will be sitting. The Contractor shall use a listener standing height of five feet three inches (5.25') ± 1" for rooms where the primary function will be standing.

3.5 AUDIO SYSTEM PERFORMANCE REQUIREMENTS

A. The Contractor shall test and provide documents verifying all the following performance criteria. The Architect/Engineer shall be informed when the testing will take place and have the option to witness the testing and ask for additional testing for any reason.

B. The Contractor shall develop an Audio Coverage Uniformity Measurement Location (ACUML) plan for each separate main loudspeaker and delay speakers. The seating area is based on the project floor plans.

1. The Contractor shall follow any Aim Schedules, after verifying polarity for each cabinet.

2. The plan shall represent the majority of the listening area and perimeter seating in the direct field of main speakers.

3. A center point of primary direct field coverage shall be determined for reference.

4. A -6 dB mid band projection angle shall be reviewed, tested for and confirmed in seating.

5. Should loudspeakers differ for uniform coverage from the highest level and minimize or require adjustment, review with A/E before lift access is denied and overlap of uniformity lapses become permanent.

C. The tests shall be performed at the multiple locations defined on the ACUML plan representing the majority of the listening area(s). The Contractor shall indicate on the floor plan drawings where each test was performed, with the corresponding graphic plot, and submit with the final documentation for review and approval by the Architect/Engineer.

D. The test shall be taken with AES2 Broadband pink noise at a minimum of 15 dB above the reference ambient noise level, taking caution to not overdrive and clip any component of the system and never have sustained feedback.

E. The audio system(s) shall meet the following minimum requirements:

1. Achieve a total average SPL of 90 dBA in most of the seating area with additional "clean" headroom of 12 dB as typical.

a. For speaker testing use Flat or "X" at all times. For listening and listener level testing use A weighting or C weighting for high levels, > 95 dBA.

b. Verify headroom and bandpass initially while testing is prioritized for speech clarity, low feedback potential.

c. High impact media is also specified, only after speech clarity is tested and adjusted for, with extended ranges rated to the - 3dB half power point of the bass speaker system.

d. Adjust subs for amplified music that is a rising EQ curve typically +6-8 on the low end.

2. The system's initial total SPL frequency response shall be within ± 6 dB from 45 Hz to 10,000 Hz. All efforts shall be made to equalize the system's frequency

response possible throughout the main loudspeaker system's entire rated spectrum.

a. Extend frequency response to the specified range of the system after testing and verifying of above capability.

b. A/E will add slopes and house curves and adjust as required with rising bass for music path file and flattened path file for speech.

3. All vocal/talker microphones shall have high and low pass filters preset to minimize rumble, pop and hiss. The high pass filter cutoff frequency shall be set between 160-200 Hz, with a 12 dB per octave slope, minimum. The low pass filter cutoff frequency shall be set at 12,000 Hz, with a 6 dB per octave slope. Adjust frequency and slope as required to maximize performance for both male and female voices.

4. The subwoofer/speaker low/high crossover points shall be a Butterworth (BW) filter set at the manufacturers suggest point such as from 80 Hz with a 24 dB per octave slope. This crossover point shall be adjusted as needed to achieve a smooth frequency response.

5. The subwoofer high-pass filter shall be set to manufacturer's recommended half-power point.

3.6 ASSISTED LISTENING SYSTEM (ALS) PERFORMANCE REQUIREMENTS

A. The Contractor shall verify that the ALS system(s) meets the following minimum performance requirements at the earphone or headset:

1. Reach a minimum total SPL of 74 dBA and no greater than 85 dBA, with a minimum of a 40dB dynamic range volume control.

2. Achieve a minimum signal-to-noise (S/N) ratio of 18dB. It is recommended to achieve a minimum signal-to-noise (S/N) ratio of 25dB to accommodate children.

3. Ensure peak clipping levels do not exceed 18dB down from the peak input signal level.

B. FM-based systems shall operate within the FCC-reserved assisted listening frequencies of 72 to 76 MHz or the 216 to 217 MHz (preferred) range and comply with the FCC transmitter power requirements. Verify antennae loss

3.7 DSP-BASED AUDIO PROCESSOR PROGRAMMING

A. Full system programming shall be provided for the system. Programming shall be performed by a factory trained and certified programmer or an employee of the equipment manufacturer.

B. DSP pathfile with initial settings shall be provided by the Contractor for review by the Architect/Engineer before installation.

C. A dual pathfile approach is used, one for all speech one for all music.

D. The IP-based audio (IEEE AVB, Dante, etc.) and components shall be on a dedicated Virtual LAN (VLAN) for the A/V systems. These components shall be on a dedicated subnetwork of the VLAN. The Contractor shall coordinate these requirements with the Owner prior to installation.

E. A parametric EQ shall be provided after each crossover point or as approved in the DSP path file during shop submittal review. These shall be utilized to set the speaker output as defined in the Audio System Calibration section within this specification. These equalizers should not be made available to the user to adjust.

F. Levelers, compressor/limiters, duckers, gates and delays shall be preset during testing and commissioning and are not available for user adjustment following commissioning.

1. Adjust delays for time of flight plus 8 to 10 ms, typical.

G. Provide each microphone input with high-pass filter, 5-band parametric EQ, auto-leveler and volume module. Provide line level inputs with high-pass filter, 3-band parametric EQ, compressor/limiter, and volume module.

H. A broadband pink noise generator shall be provided with a selectable on/off control button within the DSP path file. The noise shall be routable through all processing EQs and speaker outputs during testing.

I. Provide volume meters with labeling for each input and each output.

J. The Contractor shall utilize the latest version of the programming software.

K. The Contractor shall ensure that all components are updated to the latest firmware at the completion of the project.

3.8 DSP-BASED AUDIO PROCESSOR CONTROL SOFTWARE PROGRAMMING

A. Full system software programming shall be provided for the system. Programming shall be performed by a factory-trained and certified programmer or an employee of the equipment manufacturer.

B. The Contractor shall schedule a series of meetings with the Owner and Architect/Engineer to define and determine the exact page layout requirements prior to the final configuration of the audio system. An Owner sign-off of the final layouts shall be required.

C. The Contractor shall use the latest version of the software.

D. At a minimum, there shall be password-protected pages for zone combining, input/output volume control with meters, speaker output volume control with meters, signal routing, signal processing (EQ's, feedback suppression, etc.), and supervision/maintenance for all spaces and combined zones.

3.9 MULTIMEDIA CONTROL SYSTEM INTEGRATION AND PROGRAMMING

A. Programming and Integration for Control Systems:

1. Full system programming shall be provided for the system. Programming shall be performed by a factory trained and certified programmer or an employee of the equipment manufacturer.

2. The Contractor shall schedule a series of meetings with the Owner and Architect/Engineer to define and determine the exact integration requirements of the control system prior to the installation of the control system and components. An Owner sign-off of the final configuration shall be required.

3. This section only defines the minimum requirements. The programmer shall provide complete programming for a fully functional system.

4. The Contractor shall utilize the latest version of the programming software.

5. The Contractor shall ensure that all components are updated to the latest firmware at the completion of the project.

6. The IP-based control system and controlled components shall be on a dedicated Virtual LAN (VLAN) for the A/V systems. These components shall be on a dedicated subnetwork of the VLAN. The Contractor shall coordinate these requirements with the Owner prior to installation.

7. Integration and programming of the following pieces of equipment shall be provided, with the following minimum features and functions:

   a. All equipment shall include on/off control, except for equipment that must remain active for system functionality.

   b. Integration of HDCP (High-bandwidth Digital Content Protection) and DPCP (Display Port Content Protection) protected content and sources:

      1) No protected sources or content shall be allowed to be selected to route through non-protected devices and displays. A warning shall be displayed stating this information to the user.

   c. DSP Audio Processor Integration:

      1) The Contractor shall provide bi-directional RS-232 or Ethernet control system connections and programming with the following minimum functions:

         a) On/off control of power
         b) Audio master volume and mute.
         c) Volume and mute control of simple mix microphones and media sources.
         d) Preset mode selection.

   d. Power Sequencer Integration:

      1) The Contractor shall provide contact closure-based control or bi-directional RS-232 or Ethernet control system connections and programming with the following minimum functions:

         a) Power on/off control.

         b) On/off status via +12VDC output from the sequencer to the I/O input of the control system processor.

B. Programming and Configuration for Touch Panels:

1. This section only defines the minimum requirements. The programmer shall provide complete touch panel layouts and programming for a fully functional system.

2. The Contractor shall schedule a series of meetings with the Owner and Architect/Engineer to define and determine the exact touch panel layout requirements prior to the purchase and installation of the touch panels. An Owner sign-off of the final layouts shall be required.

a. Some tabs, pages, buttons, and functions may be required to have a password at the Owner's discretion. This shall be coordinated during the meetings.

3. Contractor logos are not allowed on the touch panels. The Contractor shall coordinate with the Owner on desired logos to be displayed.

4. All programming for interface and control of all devices shown on the drawings shall be provided. Programming shall be provided for the following minimum functionality:

a. The main screen shall include graphical buttons for the primary room functions.

1) Upon selection of the graphical button, all the required functions shall be displayed on the screen. All required equipment shall turn on.

b. Master System On/Off Control:

1) When the master system off button is selected, all capable components within the system shall be turned off or placed on standby, except for equipment that is required to remain on for the system to function like the control system processor.

c. The main screen shall include graphical buttons for the selection of individual source selections.

1) Upon selection of the graphical button for a source selection, all functional controls for the pieces of equipment, as well as all status indicators, shall be provided in graphical format on the screen.

d. The main screen shall include a button for advanced equipment status and monitoring.

1) Upon selection of the graphical button, the page shall display the on/off status of all monitored equipment, projector lamp hours, projector filter status, and all other features listed within this section that require monitoring.

e. The main screen shall include a button for microphone volume control and muting.

1) Upon selection of the graphical button, it shall display the individual volume level of each wired and wireless microphone, with a mute for each.

f. At all times, on all screens, a button shall be provided to return to the main screen, except for modal pop-ups.

g. A master volume control and mute shall be provided at all times on all screens, except for modal pop-ups.

h. A master video mute shall be provided at all times on all screens, except for modal pop-ups and audio-only functions.

i. A modal countdown timer shall be displayed showing the warmup and cooldown time of the projector. All functions shall be locked out while the projector is in cooldown mode.

j. All unused hard buttons shall not be labeled. A blank touch panel bezel shall be provided if no hard buttons are used.

C. Touch Panel Layout Principles, Considerations and Guidelines:

1. Icons and Buttons:

a. Icons shall not be used solely as a button but can be embedded in a button.

b. Icons shall appear to be flat and unpressable.

c. Status bars or text windows for time, date, room number, and similar information shall appear to be slightly depressed into the screen and appear to be unpressable.

d. Buttons shall appear to be pressable by appearing to come off the screen with beveled edges, lighting gradients, and shadows. When pressed, the button shall appear to be depressed into the screen.

1) Buttons that are momentary shall change color when pressed, appear to depress, then pop back up and revert to the original button color and state.

2) Buttons that are not momentary shall change color when pressed, appear to depress, remain depressed, then pop back up, and revert to the original button color and state when pressed again.

e. Buttons and icons shall appear to be lit from the top left corner of the screen.

f. Buttons shall be grouped together according to general function.

g. Button size shall be based on the ratio of Phi (1:1.618) and be sized appropriately based on the screen area and dpi (pixel pitch).

h. Maintain a minimum of 5 to 10 pixels between buttons on small to medium touch panels, and a minimum of 10 to 15 pixels between buttons on medium to large touch panels.

i. Telephone dialer keypads shall be based on the ITU-T E.161/ANSI TI-703 standard telephone layout and include the a-z letters below each appropriate number.

j. TV and radio tuner keypads shall be based on the ITU-T E.161/ANSI TI-703 standard telephone layout, except for the asterisk (*) being replaced by a dot (.) and the pound (#) being replaced with Enter.

k. IP-address keypads shall be based on the standard computer keyboard 10-key numeric keypad typically found on the right side of the keyboard.

l. Buttons such as Power, Play, Stop, Record, Rewind, Previous, Forward, Eject, Return, Next, Up, Down, Left, Right, Plus, Minus, etc. shall use standard industry symbols. Record shall always be a solid red circle.

2. Text and Fonts:

   a. The Contractor shall use a standard sans-serif bold **Arial** or **Calibri** font style unless the Owner dictates otherwise.

   b. Words shall have the first letter capitalized and the rest of the word lower case. No words shall be all capitals or all lower case. Follow standard grammatically correct sentence structure where the first word is capitalized and the rest of the sentence is lower case, followed by the appropriate punctuation mark with accurate syntax and correct verbs.

   c. All font size in a single group or cluster shall maintain the same font size. Headers to a group or cluster shall have a slightly enlarged font size. and footers shall have a slightly smaller font size in comparison to the group font size to maintain a visual hierarchy.

3. Color Considerations:

   a. Colors shall be selected so that, when converted to monochrome, all text, buttons, icons, groups, clusters, borders, etc. are clearly visible to accommodate all color blind or color-impaired individuals and ADA requirements.

   b. Background colors shall be cool low saturation colors such as grey, blue, or green and their analogous colors, and be a gradient from top down or top left to bottom right.

   c. Base colors shall be analogous to the background color but be of a higher saturation to stand out more clearly.

   d. Button colors shall be analogous to the background color, stand out clearly from the base colors, and be of a higher saturation cool color, gray, or a low saturation black.

   e. Icon, symbols, and text color shall be a neutral white or black, or a low saturation grey, and shall clearly stand out from the background or button it is placed on.

   f. Buttons for modal acknowledgement, exit or return, or other modal action shall be a warm color such as red or yellow and their analogous colors.

   g. Buttons, icons, symbols or text for emergency or urgent notifications shall be bright red.

4. Pages and Background:

   a. Groups and clusters shall have clearly defined borders, with spacing between adjacent groups.

   b. Modal pop-up windows or pages shall be required when a command requires user input before it is executed or when a button has multiple nested elements to control, such as microphone volumes, zone control, lighting and environment control, advanced system controls, etc.

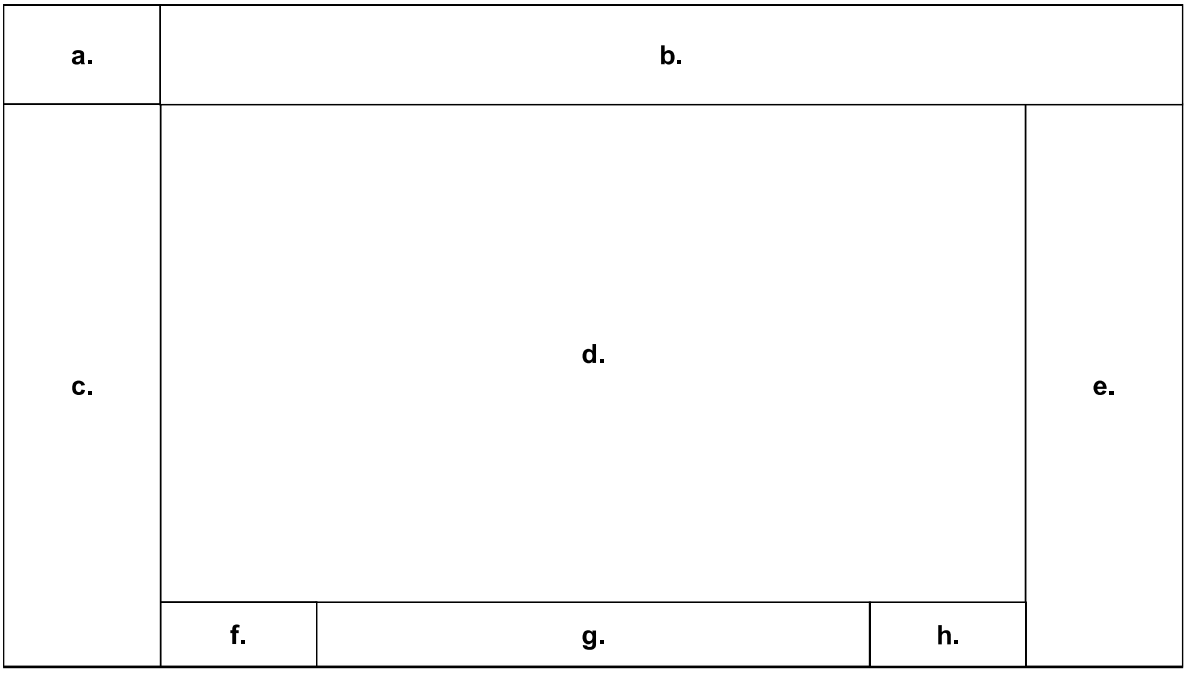
      1) The modal pop-up pages shall dim and grey out the background and buttons, overlay the main page, and have a clear back or exit button to bring the user back into the active page the user was on before the modal pop-up.

2) A model pop-up timer page shall appear when a projector is being turned on or off for the appropriate warmup or cooldown time. No additional commands shall be allowed during this time.

3) Model pop-ups shall not replace or completely overlay the background.

c. Images or pictures shall never be used as backgrounds to any page other than a master start page, if appropriate.

5. Medium to Large Format Touch Panel Layout Guideline Template:



a. Client Logo – Static Window

b. A/V Source Selection – Static Window

c. Display Power, Screen Controls, Light Controls, Shade Controls, and other Environmental Controls – Static Window

d. Controls for Selected Source and Status or Home Page – Dynamic Window

e. Master Volume and Mute, Video Mute, and Microphone Volume – Static Window

f. Home Button – Static Window

g. Date, Time, and Room Number – Static Window

h. Master System Off – Static Window

3.10 SYSTEM COMMISSIONING

A. The Contractor shall notify the Architect/Engineer and Owner prior to conducting final system commissioning.

B. Provide a signed statement with the following items noted as complete or not:

1. Video displays check for power and continuity with local signal.

2. “Quiet time” testing is scheduled.

3. Loudspeakers tested with pink noise, adjusted and aimed correctly Verified speaker manufacturers vertical and horizontal installed polar patterns are correct.

4. DSP is preset per Specification 27 41 00. All HPF and blocks ready, labeled and operating.

5. Majority of AV jacks tested. No audible hum evident. Polarity verified.

6. Speaker load (Z) recorded.

7. Separate path for all media.

8. Audio mixer optimized and preset.

9. Unity gain reviewed from input preamp to amplifier/DSP out. No overload.

10. Headroom checked: > +15 dB (typical) for headroom peaks before any overload.

11. DSP adjusted for acoustic feedback or howl & under control. A “feedback suppressor” is not desired.

12. Primary mics voice tested without overload

13. Limiter protection in for maximum continuous peak user volume levels.

14. Loudspeakers: Perform test/adjustments with no distortion, no overload, proper levels, and no hum. High quality test files used, (no phones/mp3).

15. Initial measurements made with precision sound level meter. Speakers test noise was pink, not A weighted but “flat:

16. 70V and distribution balanced and set.

17. “House zero”/touch panels to be set with current DSP.

18. Appropriate personnel scheduled for Owner training for both video and audio.

Contractor signature:

Date:

3.11 FIELD QUALITY CONTROL

A. Where these specifications require a product or assembly without the use of a brand or trade name, provide a product that meets the requirements of the specifications, as supplied and warranted by the system vendor. If the product or assembly is not available from the system vendor, provide product or assembly as recommended by the system vendor.

B. Periodic observations will be performed during construction to verify compliance with the requirements of the specifications. These services do not relieve the Contractor of responsibility for compliance with the Contract Documents.

3.12 FIELD SERVICES

A. The installer shall conduct a planning meeting with the Owner. The purpose of this meeting shall be to determine all equipment settings that are considered preferences (where proper system operation does not depend on the setting).

B. The installer shall include labor for all planning and all programming activities required to implement the Owner's preferences for equipment settings.

C. It shall be the responsibility of the Contractor/installer to provide a complete, functional system as described by the design documents. These responsibilities include:

1. Complete hardware setup, installation and wiring and software configuration.

2. Complete programming of software in accordance with the Owner's desires determined by the planning meeting.

3. Complete system diagnostic verification.

4. Complete system commissioning.

3.13 SYSTEM ACCEPTANCE

A. The Contractor shall submit for review a formal acceptance and system checkout procedure. The system checkout procedures shall include all system components and software. The Contractor shall perform the tests and settings and document all results.

3.14 SYSTEM DOCUMENTATION

A. Complete documentation shall be provided for the system. The documentation shall describe:

1. All operational parameters of the system.

2. Complete documentation of programming and features.

3. Complete operating instructions for all hardware and software.

B. The following sections shall be provided in the system documentation:

1. User Manual: A step-by-step guide and instructions detailing all system user functions.

2. Technical Manual: A comprehensive document providing all system operations, troubleshooting flowcharts, functional system layout, wiring diagrams, block diagrams and schematic diagrams.

3. Maintenance Manual: A comprehensive document on all aspects of physical maintenance of the systems, including cleaning of the displays, bulb changes, filter cleaning, filter changing and UPS maintenance.

3.15 SYSTEM TRAINING

A. All labor and materials required for on-site system training shall be provided. Training shall be conducted at the project site using the project equipment.

1. Provide ten (10) days advance notice of training to the Owner and Architect/Engineer.

2. The Architect/Engineer shall be present to attend the training during his “Quiet Day” and Commissioning date as noted in other sections. Agenda includes:

   a. Walkthrough for basic system only- (connections, touch panel, a wireless).

   b. Main power on/ off, select simple system.

      1) ALL presets operating as designed.

      2) Wireless mic in place.

      3) Media playback with high resolution device.

   c. House mixer and production system “attended.”

B. At a minimum, the following training shall be conducted:

1. Simple User: A session detailing basic then all other system functions and operations that a daily “simple” user will encounter. (Non-technical and staff only).

2. Technical User: Provide configuration training on all aspects of the system(s), including equipment and software.

3. Maintenance: Provide training on all aspects of physical maintenance of the systems, including cleaning of the displays, bulb changes, filter cleaning and filter changing.

C. Minimum on-site training times shall be:

1. Users: One (1) hour per room or local system.

2. Technical HS staff: Two (2) hours over two sessions, with full system setup and ready including mics and monitors plugged in.

3. Maintenance user: One (1) hour.

4. Owner video coordination for Owner systems tie in.

5. Attend first public use with system in place. This session shall be attended by contractor including off hours evening when requested.

END OF SECTION 27 41 00

SECTION 32 1713 - PARKING BUMPERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Section includes parking bumpers/wheel stops.

1.2 RELATED DOCUMENTS

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

B. Related Specification Sections

1. Section 32 1216 – Asphaltic Concrete Paving.
2. Section 32 1313 – Concrete Paving.

1.3 SUBMITTALS

A. Submittal procedures and requirements shall comply with Division 01 Specification Sections.

B. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

A. Concrete Wheel Stops: Normal weight 4000-psi minimum compressive strength, air-entrained, steel-reinforced (Two #5 bars min.) concrete. Bumper dimensions shall be 5 inches high by 9 inches wide by 84” long. (For trucks: 7 inches high by 14 inches wide by 108 inches long). Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or factory-drilled vertical holes through wheel stop for anchoring to substrate.

1. Surface Appearance: Smooth finish, free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
2. Mounting Hardware: Galvanized-steel dowel, 1/2-inch diameter, 18-inch minimum length.
3. Reinforcing Steel: ASTM A 615, Grade 40, deformed bars.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.

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

3.2 INSTALLATION

A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.

B. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

SECTION 32 31 13 – CHAIN LINK FENCES AND GATES

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. Chain-link fences
2. Swing gates
3. Relocation of existing 8’ chain link fence.
4. Removal an relocation of existing vehicle steel swing gates, posts and locking hardware.

B. Related Requirements

1. Section 03 30 00 – Cast-in-Place Concrete

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Fence and gate posts, rails, and fittings.
2. Chain-link fabric, reinforcements, and attachments.
3. Accessories: Privacy slats, barbed wire.
4. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include accessories, hardware, gate operation, and operational clearances.

C. Samples: For each polymer-coated product and for each color and texture specified, in 6-inch lengths for components and on full-sized units for accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of chain-link fence and gate, from manufacturer.

B. Product Test Reports: For framing strength according to ASTM F 1043.

C. Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with manufacturers Product Manual and with requirements indicated below:

1. Fabric Height: As indicated on Drawings.

2. Steel Wire Fabric: Wire with a diameter of 0.148 inch.

a. Mesh Size: 2 inches.

b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz./sq. ft. with zinc coating applied before weaving.

c. Polymer-Coated Fabric: ASTM F 668, Class 2a over zinc-coated steel wire.

1) Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2) Location: As indicated on the drawings.

3. Selvage: Knuckled at both selvages.

2.2 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:

1. Fence Height: As indicated on Drawings.

2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.

a. Line Post: 2.375 inches in diameter.

b. End, Corner and Pull Post: 2.875 inches.

c. Location: As indicated on drawings.

3. Heavy Industrial Strength: Material Group IA, round steel pipe, Schedule 40.

a. Line Post: 2.375 inches in diameter.

b. End, Corner and Pull Post: 2.875 inches in diameter.

4. Horizontal Framework Members: Top and bottom rails complying with ASTM F 1043.

5. Brace Rails: Comply with ASTM F 1043.

6. Gate Posts: Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

Leaf Width	Gate Post	Lbs./lin. ft.
Up to 6'	2.875" OD pipe	5.79
Over 6' to 12'	4.000" OD pipe	9.11
Over 12' to 18'	6.625" OD pipe	18.97
Over 18'	8.625" OD pipe	28.58

7. Metallic Coating for Steel Framing:

a. Type A zinc coating, Not less than minimum 2.0-oz./sq. ft. average zinc coating according to ASTM A 123/A 123M

b. Type B zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.

c. External, Type B zinc with organic overcoat and internal, Type D zinc-pigmented coating, , consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film

d. Type C, Zn-5-Al-MM alloy coating, consisting of not less than 1.8-oz./sq. ft. coating.

e. Coatings: Any coating above.

f. Finish to match fence fabric

8. Polymer coating over metallic coating.

a. Color: Match chain-link fabric.

2.3 TENSION WIRE

A. Metallic-Coated Steel Wire: 0.177-inch-diameter, marcelled tension wire according to ASTM A 817 or ASTM A 824, with the following metallic coating:

1. Type I: Aluminum coated (aluminized).

2. Type II: Zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:

   a. Class 3: Not less than 0.8 oz./sq. ft. of uncoated wire surface.

   b. Class 4: Not less than 1.2 oz./sq. ft. of uncoated wire surface.

   c. Class 5: Not less than 2 oz./sq. ft. of uncoated wire surface.

   d. Matching chain-link fabric coating weight.

3. Type III: Zn-5-Al-MM alloy with the following minimum coating weight:

   a. Class 60: Not less than 0.6 oz./sq. ft. of uncoated wire surface.

   b. Class 100: Not less than 1 oz./sq. ft. of uncoated wire surface.

   c. Matching chain-link fabric coating weight.

B. Polymer-Coated Steel Wire: 0.148-inch- diameter, tension wire according to ASTM F 1664, Class 2a over zinc-coated steel wire.

1. Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2.4 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and single and double swing gate types.

1. Gate Leaf Width: As indicated.

2. Gate Fabric Height: As indicated.

B. Pipe and Tubing:

1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing.

2. Gate Posts: Round tubular steel.

3. Gate Frames and Bracing: Round tubular steel.

C. Frame Corner Construction: Welded.

D. Hardware:

1. Hinges: 180-degree outward swing.

2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

3. Stops: Center stops for double gates shall consist of a devised arranged to be set in concrete and to engage the plunger bar of the latch. Stop is to be a mushroom type or flush plate with anchors.

2.5 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.6 PEDESTRIAN GATE

1. New pedestrian swing gates at Murray Bleachers as indicated on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

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

C. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

D. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

E. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

F. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Concealed Concrete: Top 2 inches below grade to allow covering with surface material.

b. Interior Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material per manufacturer's written instructions, and sloped finish to drain water away from post.

G. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

H. Line Posts: Space line posts uniformly at 96 inches o.c.

I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage unless otherwise indicated.

J. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

K. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

L. Install baseball/softball backstop in strict accordance with manufacturer's recommendations and as indicated.

M. Install traffic control gates in strict accordance with manufacturer's recommendations and as indicated.

N. Install mechanical/electrical yard gates and pedestrian in strict accordance with manufacturer's recommendations and as indicated.

O. Install privacy slats accordance with manufacturer's recommendations and as indicated.

END OF SECTION 32 31 13

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CAUTION !!

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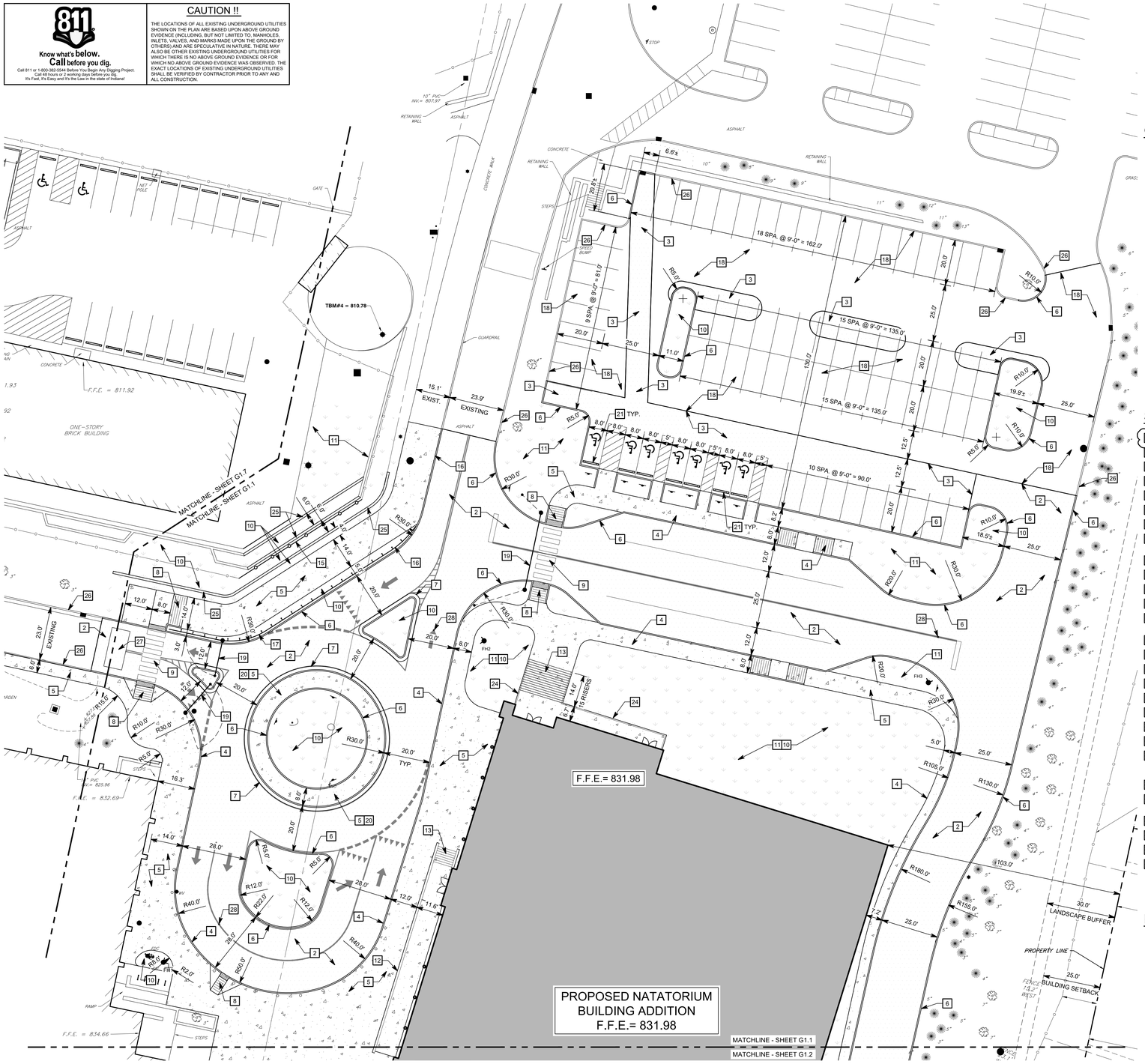

GENERAL NOTES

1. SEE DRAWING GD0.1 FOR GENERAL NOTES AND ADDITIONAL LEGEND.
2. TOPOGRAPHIC CONDITIONS AND EXISTING UTILITIES SHOWN WERE PROVIDED BY THE SURVEYOR. THE ENGINEER MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED.
3. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE PROJECT AREA INCLUDING UNDERGROUND UTILITY CONDITIONS, LOCATION AND DEPTH PRIOR TO ANY OTHER SITE CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER.
4. NO EARTH DISTURBING ACTIVITY MAY COMMENCE WITHOUT AN APPROVED STORM WATER MANAGEMENT PERMIT.
5. UTILITY RELOCATIONS REQUIRED BY THE PROJECT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER. UTILITY LINE RELOCATIONS REQUIRED FOR ROAD PROJECTS THAT RESULT IN A CONFLICT WITH PROPOSED DEVELOPMENT SHALL BE THE DEVELOPERS RESPONSIBILITY TO RESOLVE WITH THE UTILITY. EXISTING POLE LINES REQUIRED TO BE RELOCATED TO WITHIN ONE FOOT OF PROPOSED RIGHT-OF-WAY LINE.
6. DAMAGE TO THE EXISTING RIGHT-OF-WAY SHALL RESTORED/REPAIRED TO THE SATISFACTION OF THE CITY AT THE COMPLETION OF THE PROJECT. THE CONTRACTOR IS ENCOURAGED TO INSPECT THE RIGHT-OF-WAY WITH THE CITY PRIOR TO THE START OF CONSTRUCTION TO DOCUMENT THE EXISTING CONDITION OF THE RIGHT-OF-WAY.
7. REFER TO SITE DETAILS ON SHEETS G4.1, G4.2 AND G4.3 AND ENLARGED PLANS ON SHEETS G1.3, G1.4, G1.5 AND G1.6
8. THE CONTRACTOR SHALL REMOVE AN ADDITIONAL 12" OF SOIL BELOW PROPOSED STONE BASE UNDER ALL NEW PAVEMENT.

SITE KEYNOTES

1. 8" CONCRETE PAVEMENT, SEE DETAIL ON SHEET G4.1
2. HEAVY DUTY ASPHALT PAVEMENT, SEE DETAIL ON SHEET G4.1
3. MEDIUM DUTY ASPHALT PAVEMENT, SEE DETAIL ON SHEET G4.1
4. MONOLITHIC CURB AND WALK, SEE DETAIL ON SHEET G4.1
5. CONCRETE SIDEWALK, SEE DETAIL ON SHEET G4.1
6. 6" CONCRETE CURB, SEE DETAIL ON SHEET G4.1
7. CONCRETE ROLL CURB & GUTTER, SEE DETAIL ON SHEET G4.1
8. CONCRETE ADA CURB RAMP, SEE ENLARGED PLANS G1.3, G1.4, G1.5 AND G1.6 FOR MORE INFORMATION
9. CROSS WALK STRIPING, THERMOPLASTIC
10. LANDSCAPE AREA, SEE LANDSCAPE PLAN SHEET L1.0
11. LAWN / TURF AREA, SEE LANDSCAPE PLAN SHEET L1.0
12. RETAINING WALL AT RAMP/WALK, SEE STRUCTURAL SHEET S1.01 AND S3.10
13. CONCRETE STEPS WITH HANDRAILS, SEE ENLARGED PLANS G1.3 AND G1.6 FOR MORE INFORMATION. SEE ARCHITECTURAL SHEET A10.09 FOR HANDRAILS
14. CONCRETE ADA RAMP, SEE ENLARGED PLAN G1.4 FOR MORE INFORMATION
15. RELOCATED 8' CHAIN LINK FENCE
16. RE-INSTALL ±60 L.F. SALVAGED GUARDRAIL TYPE 1, SEE DETAIL ON SHEET G4.2
17. 60 L.F. OF NEW GUARDRAIL TYPE 1, SEE DETAIL ON SHEET G4.2
18. ASPHALT RESURFACE AREA (1 1/2" ASPHALT SURFACE)
19. RELOCATED IRON VEHICLE GATE AND POSTS
20. STAMPED CONCRETE
21. CONCRETE PARKING BUMPER, SEE DETAIL ON SHEET G4.1
22. CONCRETE STEPS AT CANOPY WITH 2 RISERS, SEE DETAIL ON SHEET G4.2, SEE GRADING PLAN FOR ELEVATIONS. SEE ARCHITECTURAL SHEET A10.09, DETAILS 3 AND 4 FOR HANDRAILS.
23. PLANTER WALL, SEE DETAIL ON SHEET G4.2
24. RETAINING WALLS PER STRUCTURAL SHEETS S1.01, S1.02 AND S1.03. HANDRAILS PER ARCHITECTURAL SHEETS.
25. MODULAR BLOCK RETAINING WALL, SEE DETAIL ON SHEET G4.4
26. EXISTING CONCRETE CURB TO REMAIN IN PLACE
27. ASPHALT SPEED CONTROL BUMP, SEE DETAIL ON SHEET G4.1
28. FIRE HYDRANT MARKER, BLUE RAISED PAVEMENT MARKER INDOT TYPE 2 TO BE PLACED AT CENTERLINE OF ROAD.

PROPOSED SITE LEGEND

- EXISTING BUILDING
- BUILDING ADDITION
- CONCRETE PAVEMENT / WALK
- ASPHALT PAVEMENT
- LANDSCAPE OR LAWN / TURF AREA

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT
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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSULTANT
TLF

CONSTRUCTION DOCUMENTS

PETE MILMINE RENTZ REGISTERED No. 19700317 STATE OF INDIANA PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR
DRAWN BY: HHW
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE PLAN - NORTH

G1.1

Drawing Path: P:\2021\000\009\CAD\Civil\Active\09_2021-009_G1.1_SP.dwg
Plotted By: ostheller Time of Plot: 1/24/22 - 3:36pm Last Edited: 1/21/22 - 10:59am

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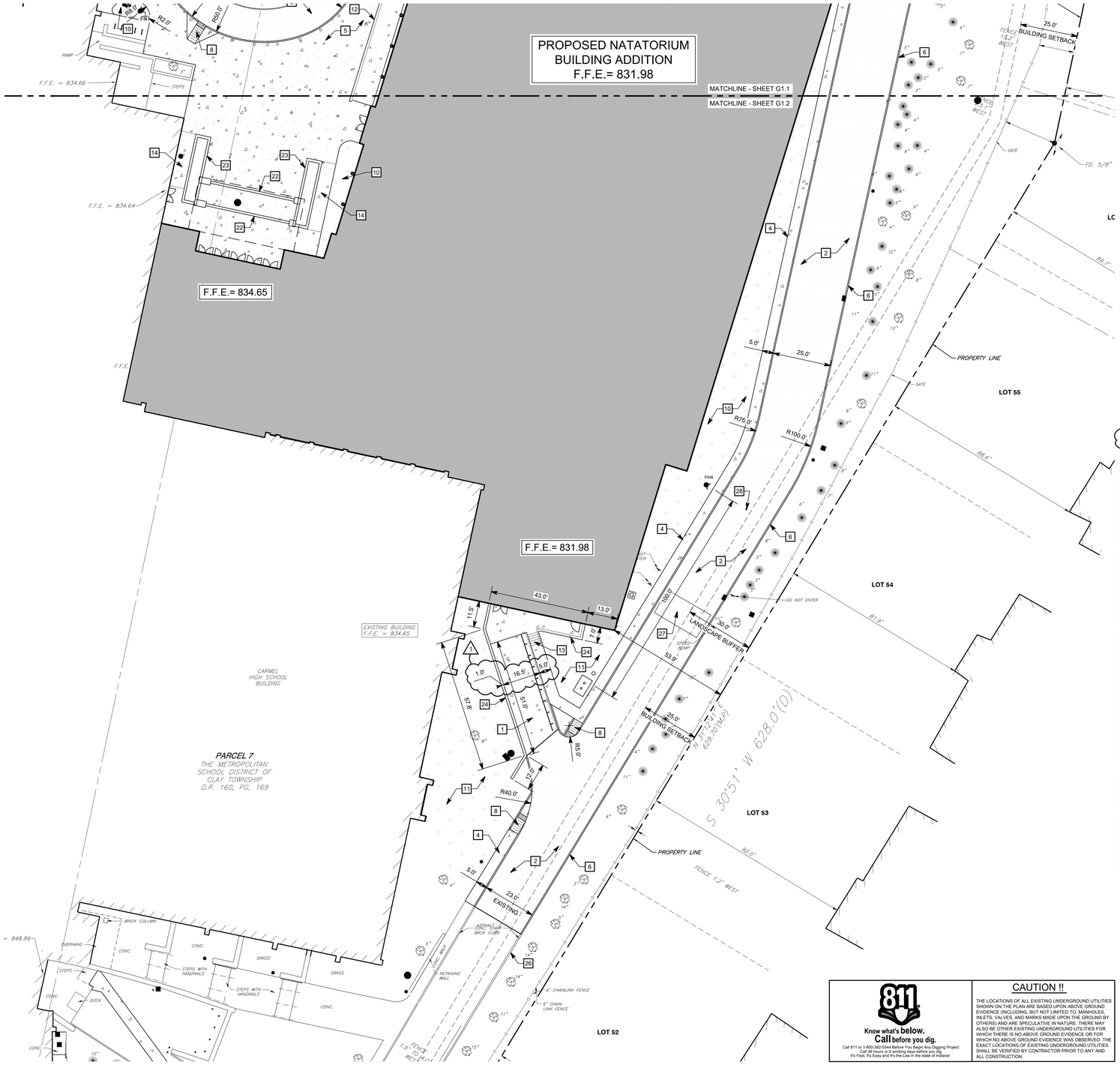
CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS



NORTH

20 0 20 40 60

GENERAL NOTES

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25. MODULAR BLOCK RETAINING WALL, SEE DETAIL ON SHEET G4.4
26. EXISTING CONCRETE CURB TO REMAIN IN PLACE
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28. FIRE HYDRANT MARKER, BLUE RAISED PAVEMENT MARKER INDOT TYPE 2 TO BE PLACED AT CENTERLINE OF ROAD.

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- BUILDING ADDITION
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- ASPHALT PAVEMENT
- LANDSCAPE OR LAWN / TURF AREA

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ARCHITECT

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CONSULTANT

TLF

CONSTRUCTION DOCUMENTS

PETER M. RONKOWSKI REGISTERED No. 19700317 STATE OF INDIANA PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR
DRAWN BY: HHW
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO△	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE PLAN - SOUTH

G1.2

Drawing Path: P:\2021\000\009\CAD\Civil\Action\09_2021-009_G1.1_SP.dwg
Plotted By: ctheller Time of Plot: 1/24/22 - 5:37pm Last Edited: 1/21/22 - 10:59am

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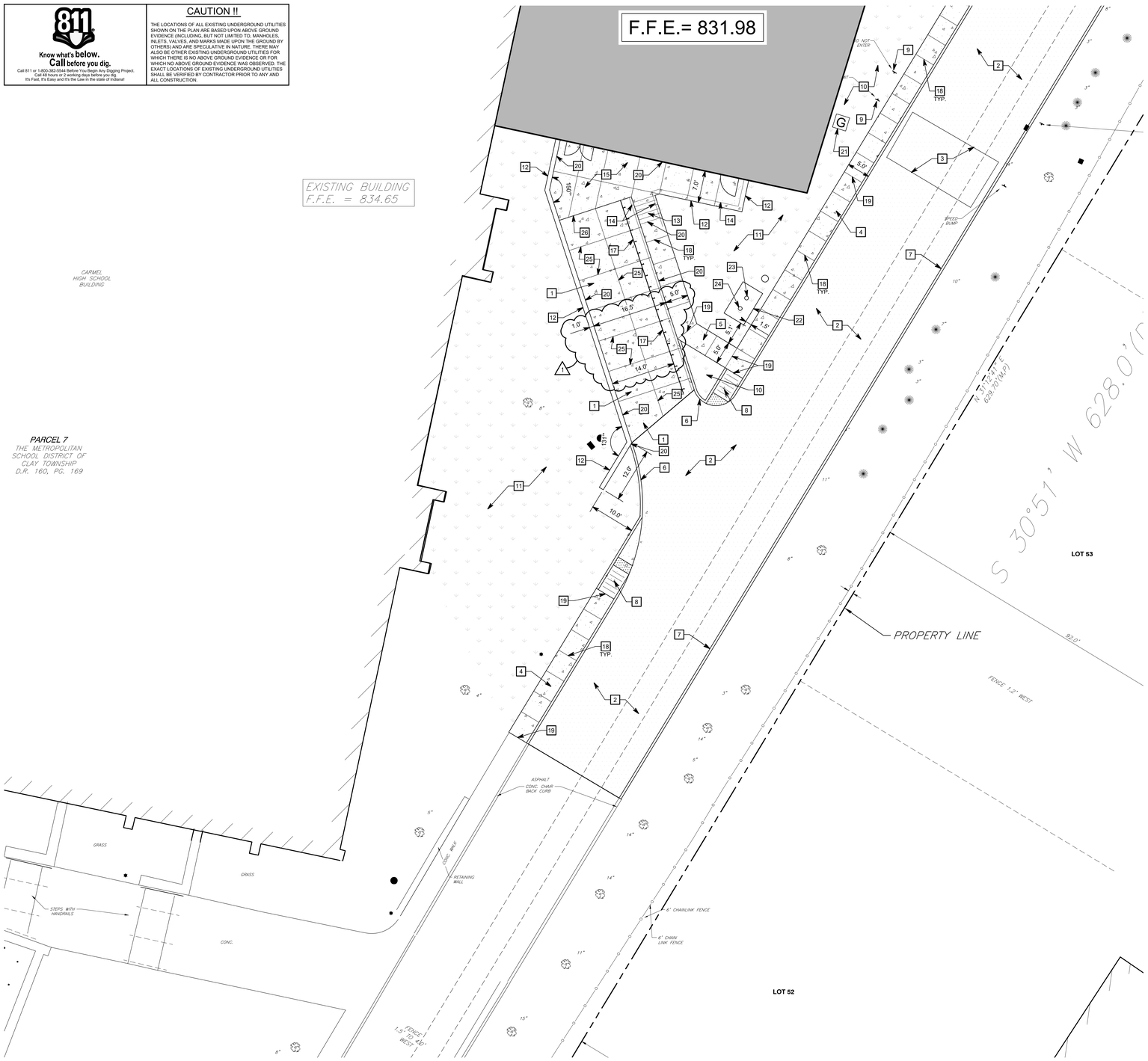

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7. REFER TO SITE DETAILS ON SHEETS G4.1 AND G4.2
8. SEE SHEETS G2.1 AND G2.2 FOR FINISHED GRADING AND SHEETS SU2.1 AND SU2.2 FOR UTILITY INFORMATION.

SITE KEYNOTES

1. 8" CONCRETE PAVEMENT
2. HEAVY DUTY ASPHALT PAVEMENT
3. ASPHALT SPEED BUMP, SEE DETAIL ON SHEET G4.1
4. MONOLITHIC CONCRETE SIDEWALK AND CURB
5. CONCRETE SIDEWALK
6. CONCRETE STRAIGHT CURB
7. CONCRETE CURB AND GUTTER
8. ADA RAMP TYPE "B", SEE DETAIL ON SHEET G4.3
9. REPLACE EXISTING SIGN AND POST, RESET NEAR ORIGINAL LOCATION
10. LANDSCAPE AREA - SEE LANDSCAPE PLAN SHEET L1.0
11. LAWN / TURF AREA - SEE LANDSCAPE PLAN SHEET L1.0
12. CONCRETE RETAINING WALL (SEE STRUCTURAL PLAN SHEET S1.03)
13. CONCRETE STEPS (SEE ARCHITECTURAL)
14. HANDRAIL (SEE ARCHITECTURAL DETAIL 11/A10.09)
15. CONCRETE SLAB (SEE STRUCTURAL PLAN SHEET S1.03)
16. SECTIONAL VALVE
17. HIGHWAY GUARDRAIL TYPE 2
18. CONCRETE SIDEWALK CONTROL JOINT
19. CONCRETE SIDEWALK EXPANSION JOINT
20. CONCRETE ISOLATION JOINT
21. GAS METER (SEE SHEET SU1.3 FOR PROPOSED NATURAL GAS LINE ROUTING. COORDINATE INSTALLATION WITH CENTERPOINT ENERGY)
22. WATER METER VAULT (SEE DETAILS ON SHEET SU2.5)
23. FIRE DEPARTMENT CONNECTION (PER CITY OF CARMEL DEPARTMENT STANDARDS)
24. POST INDICATOR VALVE (SEE DETAIL ON SHEET SU2.5)
25. CONCRETE PAVEMENT CONTROL JOINT
26. CONCRETE PAVEMENT EXPANSION JOINT

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- ASPHALT PAVEMENT
- LANDSCAPE OR LAWN / TURF AREA
- TEXTURED AND COLORED CONCRETE

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT
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CONSULTANT
TLF

CONSTRUCTION DOCUMENTS

PETE MICHMERHUIZEN REGISTERED No. 19700317 STATE OF INDIANA PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR
DRAWN BY: HHW
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE PLAN - ENLARGEMENT SOUTH DOCK AND RAMP

G1.3

Drawing Path: P:\2021\009\009\CAD\Civil\Active\10_2021-009_G1.3_ENSP.dwg
Plotted By: hwilchcarot Time of Plot: 1/20/22 - 4:14pm Last Edited: 1/20/22 - 12:00pm



NORTH

10 0 10 20 40

GENERAL NOTES

1. SEE DRAWING GD0.1 FOR GENERAL NOTES AND ADDITIONAL LEGEND.
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7. REFER TO SITE DETAILS ON SHEETS G4.1 AND G4.2
8. SEE SHEETS G2.1 AND G2.2 FOR FINISHED GRADING AND SHEETS SU2.1 AND SU2.2 FOR UTILITY INFORMATION.

SITE KEYNOTES

1. CONCRETE PAVEMENT
2. HEAVY DUTY ASPHALT PAVEMENT
3. MEDIUM DUTY ASPHALT PAVEMENT
4. MONOLITHIC CONCRETE SIDEWALK AND CURB
5. CONCRETE SIDEWALK
6. CONCRETE STRAIGHT CURB
7. CONCRETE ROLL CURB
8. ADA RAMP TYPE "A", SEE DETAIL ON SHEET G4.4
9. ADA RAMP TYPE "B", SEE DETAIL ON SHEET G4.4
10. LANDSCAPE AREA - SEE LANDSCAPE PLAN SHEET L1.0
11. LAWN / TURF AREA - SEE LANDSCAPE PLAN SHEET L1.0
12. CONCRETE RETAINING WALL (SEE STRUCTURAL SHEETS S1.01 AND S3.10)
13. CONCRETE STEPS, SEE STRUCTURAL SHEETS S1.01 AND DETAILS ON SHEET S3.10. FOR HANDRAILS, SEE ARCHITECTURAL SHEET A10.10
14. CONCRETE RETAINING WALL (SEE STRUCTURAL SHEET S1.01 AND DETAIL 3/S3.10)
15. RELOCATED 8' CHAIN LINK FENCE
16. 6" CONCRETE PAVEMENT (STAMPED - LIGHT GRAY ASHLAR SLATE PATTERN), SEE DETAIL ON SHEET G4.1 (1)
17. GUARDRAIL TYPE 1, SEE DETAIL ON SHEET G4.2
18. CONCRETE SIDEWALK CONTROL JOINT
19. CONCRETE SIDEWALK EXPANSION JOINT
20. CONCRETE ISOLATION JOINT
21. CONCRETE CONSTRUCTION JOINT
22. BIKE RACKS, 5 TOTAL (NOT IN CONTRACT) (1)
23. 5" CONCRETE SIDEWALK/RAMP WITH HANDRAILS
24. CONCRETE SIDEWALK (PER STRUCTURAL PLANS)
25. RETAINING WALL (SEE DETAIL ON SHEET G4.4)
26. BENCH (1)
27. TEXTURED CONCRETE (LIGHT SAND BLASTED FINISH)
28. COLORED (TAN, TO BE CONFIRMED BY OWNER) AND TEXTURED CONCRETE (LIGHT SAND BLASTED FINISH)
29. ASPHALT SPEED BUMP, SEE DETAIL ON SHEET G4.1
30. 4" WIDE SOLID SINGLE WHITE PAVEMENT LANE MARKING
31. 4" WIDE SOLID SINGLE YELLOW PAVEMENT LANE MARKING
32. 4" WIDE SOLID DOUBLE YELLOW PAVEMENT LANE MARKING
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34. WHITE THERMOPLASTIC PAVEMENT MARKINGS 12" WIDE x 2'-0" LONG WITH 2'-0" SPACE BETWEEN MARKINGS
35. WHITE THERMOPLASTIC YIELD LINE MARKINGS (TRIANGLES) 18" WIDE x 24" LONG SPACED AT 12" O.C. PER MUTCD STANDARDS
36. YELLOW RAISED PAVEMENT REFLECTORS @ 8'-0" O.C. PER INDOT STANDARDS
37. ROUNDABOUT (W2-6 YELLOW) SIGN WITH TRAFFIC CIRCLE (W16-12P) SIGN PER MUTCD STANDARDS
38. THREE ARROW (POINTING RIGHT) WHITE AND BLACK CHEVRON SIGN PER MUTCD STANDARDS (1)
39. 4" WIDE YELLOW DIAGONAL PAVEMENT MARKINGS @ 3'-0" O.C.
40. CONCRETE STEPS AT CANOPY WITH 2 RISERS, SEE DETAIL ON SHEET G4.2. SEE GRADING PLAN FOR ELEVATIONS. SEE ARCHITECTURAL SHEET A10.09, DETAILS 3 AND 4 FOR HANDRAILS.

PROPOSED SITE LEGEND

- EXISTING BUILDING
- BUILDING ADDITION
- CONCRETE PAVEMENT / WALK
- ASPHALT PAVEMENT
- LANDSCAPE OR LAWN / TURF AREA
- TEXTURED AND COLORED CONCRETE (1)

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

317.848.0966 WWW.FHAI.COM
350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSULTANT

TLF

CONSTRUCTION DOCUMENTS

PETER M. RONKOWSKI REGISTERED No. 19700317 STATE OF INDIANA PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR

DRAWN BY: HHW

PROJECT NUMBER: 220014.00

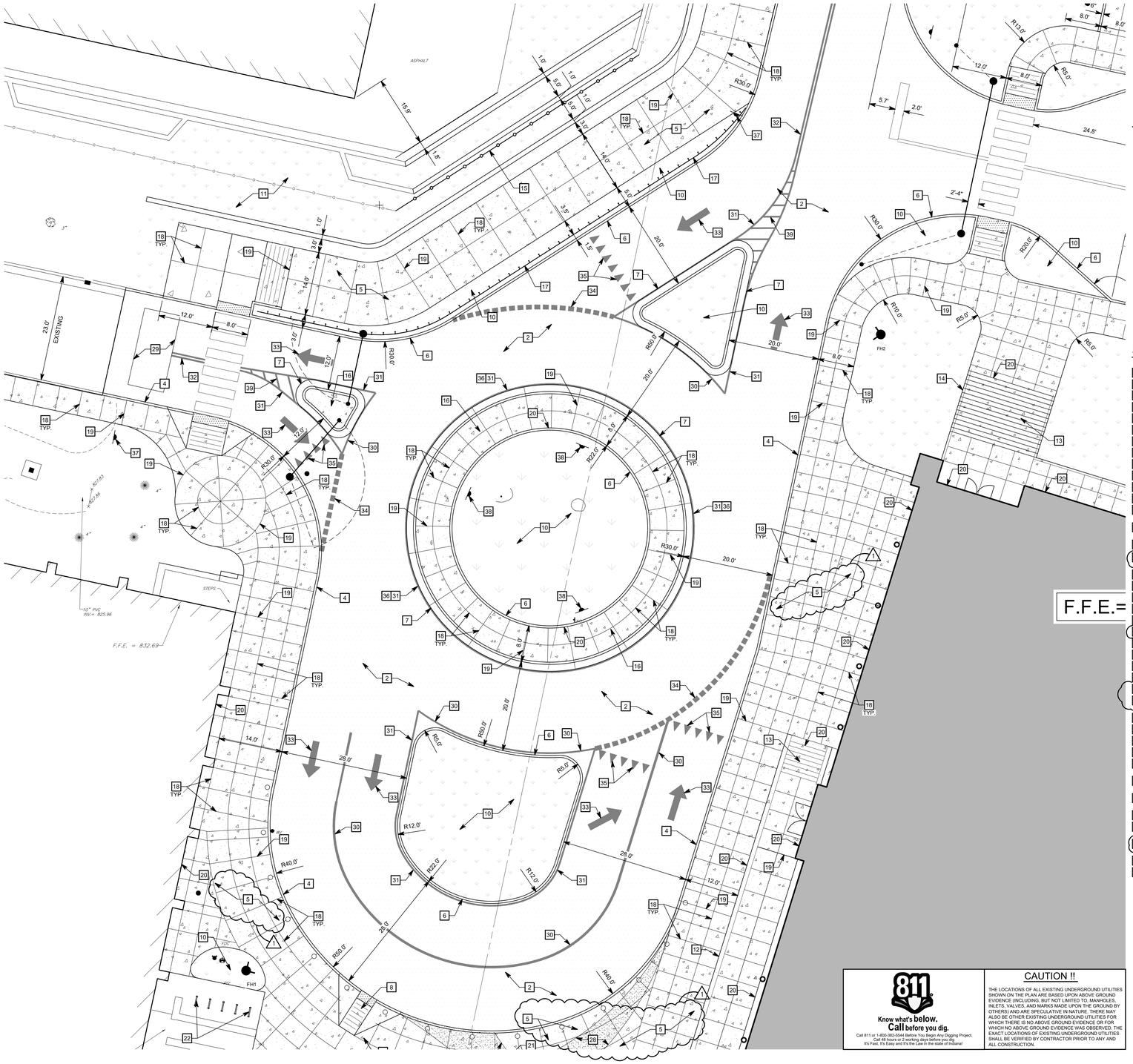
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE PLAN - ENLARGEMENT MAIN ENTRANCE PLAZA

G1.4

Drawing Path: P:\2021\000\009\CAD\Arch\L0_2021-009_G1_5_ENSP.dwg
Plotted By: ctheller Time of Plot: 1/24/22 - 3:40pm Last Edited: 1/24/22 - 3:33pm



NORTH

10 0 10 20 40

GENERAL NOTES

1. SEE DRAWING GD0.1 FOR GENERAL NOTES AND ADDITIONAL LEGEND.
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CONSULTANT

TLF

CONSTRUCTION DOCUMENTS

PETE MILLWEE RANKIN
REGISTERED
No. 19700317
STATE OF INDIANA
PROFESSIONAL ENGINEER

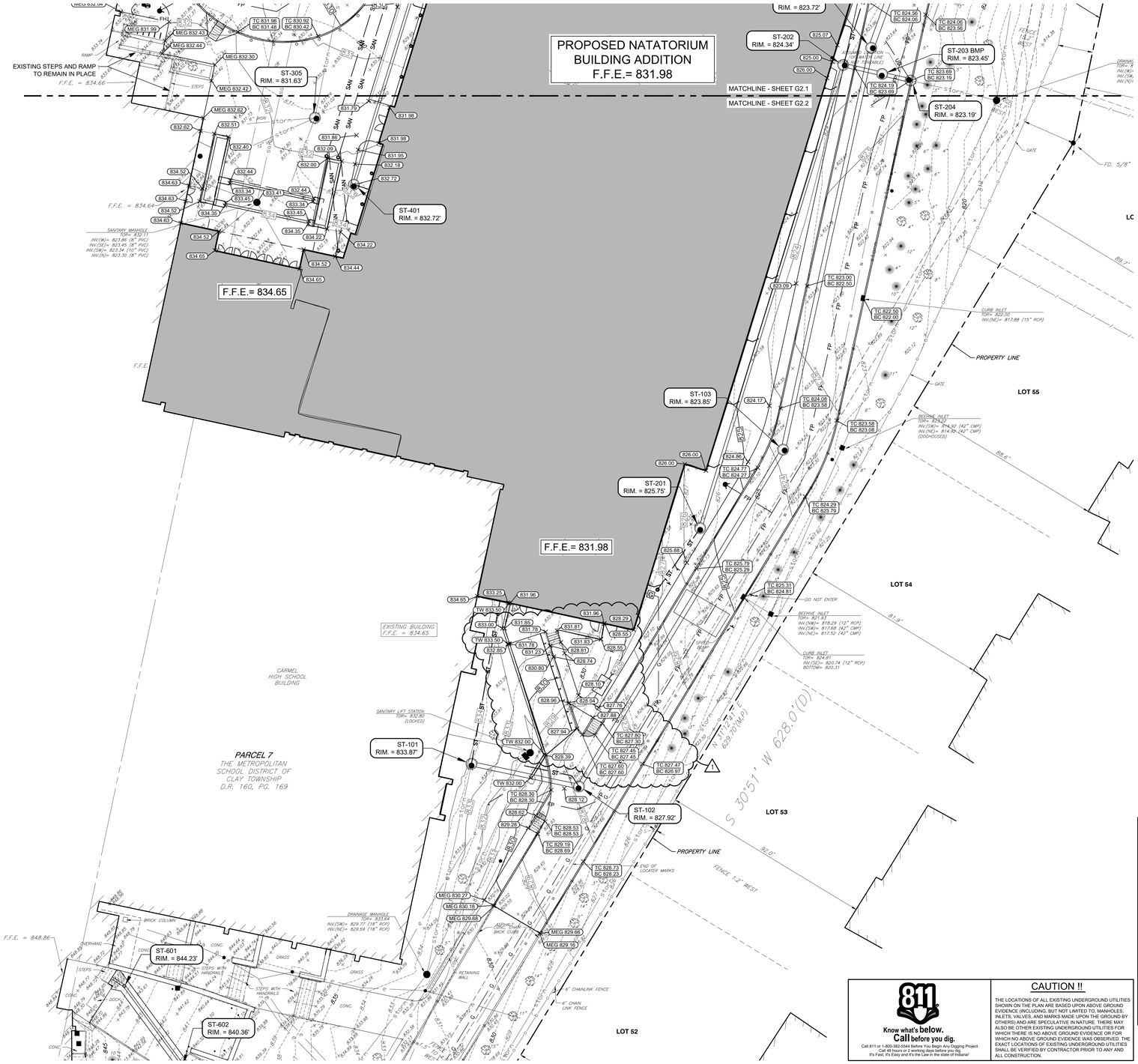
PROJECT MANAGER: PMR
DRAWN BY: HHW
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.△	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE PLAN - ENLARGEMENT ROUNDABOUT

G1.5

Drawing Path: P:_2021\000\009\CAD\Civil\Active\10_2021-009_G1.3_ENSP.dwg
Plotted By: ashelker Time of Plot: 1/24/22 - 3:40pm Last Edited: 1/24/22 - 3:35pm



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7. REFER TO UTILITY DETAILS ON SHEETS SU2.1, SU2.2 AND SU2.3
8. REFER TO STORM STRUCTURE TABLE ON SHEET SU2.3
9. ALL EXISTING MANHOLE AND CATCH BASIN CASTINGS, HYDRANTS, WATER OR GAS VALVES AND UTILITY PEDESTALS SHALL BE ADJUSTED AS REQUIRED TO MEET PROPOSED FINISH GRADE.
10. ALL STORM SEWERS ASSOCIATED WITH THIS PROJECT ARE PRIVATE AND SHALL REMAIN PRIVATE.

GRADING KEYNOTES

1. FINISHED GRADE ELEVATIONS IN MILLED ASPHALT SURFACE AREA SHALL MATCH EXISTING GRADES.
2. THE PROPOSED GRADES OF THE REPLACED CURB ALONG THE EAST SIDE OF THE PROJECT ARE CLOSE TO EXISTING GRADES. THE CONTRACTOR SHALL MINIMIZE THE EARTH DISTURBANCE EAST OF THE CURB REPLACEMENT.

GRADING PLAN LEGEND

+728.30	EXISTING SPOT ELEVATION
MEG	MATCH EXISTING GRADE
TC	TOP OF CURB
BC	BOTTOM OF CURB
TW	TOP OF WALL
730	EXISTING CONTOUR W/ ELEVATION
735	PROPOSED CONTOUR W/ ELEVATION
750.65	PROPOSED SPOT ELEVATION
TC / BC	PROPOSED CURB ELEVATION

BENCHMARKS:

ELEVATIONS SHOWN HEREON ARE BASED UPON THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD88). IT IS MY OPINION THAT THE UNCERTAINTY IN THE ELEVATION OF THE PROJECT BENCHMARK DOES NOT EXCEED 0.10 FOOT.

BM: HCBR 194 – HAMILTON COUNTY GEODETIC CONTROL DISK IN THE NORTHWEST CORNER OF CONCRETE BRIDGE DECK OF BRIDGE CARRYING RANGE LINE ROAD OVER LITTLE COOL CREEK.
ELEV. = 811.76

TBM#1: CUT SQUARE ON EAST SIDE OF CONCRETE LIGHT BASE LOCATED ON THE WEST SIDE OF THE ENTRANCE TO THE HIGH SCHOOL AUDITORIUM OFF OF MAIN STREET.
ELEV. = 856.00

TBM#2: CUT SQUARE ON EAST SIDE OF CONCRETE LIGHT BASE LOCATED ON THE WEST SIDE OF THE ROADWAY ON THE EAST SIDE OF THE HIGH SCHOOL AND BEING NORTH OF A UTILITY DRIVE AND SOUTH OF THE STAIRCASE LABELED "EAST 22".
ELEV. = 834.95

TBM#3: CUT SQUARE ON EAST SIDE OF CONCRETE BASE OF A PEDESTRIAN CROSSING SIGN LOCATED ON THE IN THE NORTHWEST QUADRANT OF STADIUM DRIVE AND SMOKEY ROW ROAD (136TH ST.).
ELEV. = 803.80

TBM#4: CUT SQUARE ON WEST SIDE OF CONCRETE LIGHT BASE LOCATED 30'± SOUTHEAST OF THE BRICK ENTRANCE TO BRIAN MURRAY MEMORIAL STADIUM AT SOUTHEAST SIDE OF PAINTED SOCCER BALL.
ELEV. = 810.78

USGS BENCHMARK INFORMATION

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REGISTERED
No. 19700317
STATE OF INDIANA
PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR

DRAWN BY: HHW

PROJECT NUMBER: 220014.00

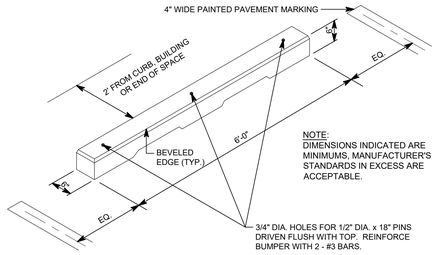
PROJECT ISSUE DATE: 12.17.2021

REV. NO.△	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

GRADING PLAN - SOUTH

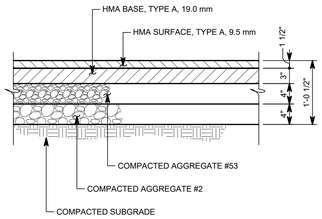
G2.2

Drawing Path: P:\2021\000\009\CAD\Civil\Active\13_2021-009_G2.1_GP.dwg
Plotted By: hwinchorst Time of Plot: 1/20/22 - 4:26pm Last Edited: 1/20/22 - 2:18pm



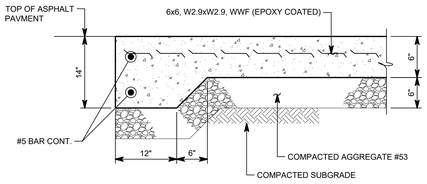
PARKING BUMPER DETAIL

NO SCALE



MEDIUM DUTY ASPHALT PAVEMENT DETAIL

1" = 1'-0"

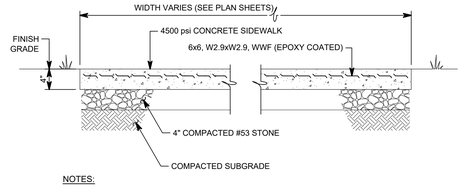


NOTES:

1. CONTROL JOINTS, EXPANSION JOINTS AND EDGES OF PAVEMENT SHALL BE HAND-TOOLED AFTER EACH FINISHING OPERATION.
2. PROVIDE EXPANSION JOINT AT INTERSECTION WITH ANOTHER SIDEWALK, BETWEEN WALKS AND BUILDINGS AND AT SUCH OTHER POINTS AS INDICATED ON THE DRAWINGS.
3. SIDEWALK SHALL HAVE 1/2" EXP. JTS. @ 48' MAX. & CONTROL JOINTS @ 6' MAX.

6" CONCRETE PAVEMENT DETAIL

1" = 1'-0"



NOTES:

1. CONTROL JOINTS, EXPANSION JOINTS AND EDGES OF SIDEWALK SHALL BE HAND-TOOLED AFTER EACH FINISHING OPERATION.
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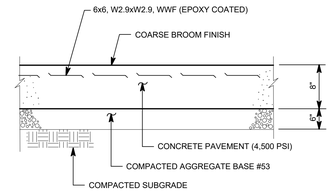
3. SIDEWALK SHALL HAVE 1/2" EXP. JTS. @ 48' MAX. & CONTROL JOINTS @ 6' MAX.

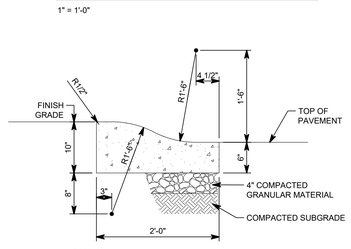
4" CONCRETE SIDEWALK DETAIL

1" = 1'-0"



8" CONCRETE PAVEMENT DETAIL

NO SCALE

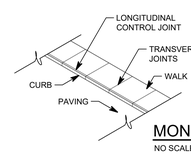


NOTES:

1. PROVIDE CONTROL JOINTS AT 10' MAX. SPACING.
2. PROVIDE EXPANSION JOINTS AT 80' MAX. SPACING AND AT ENDS OF ALL RADII.

ROLL CURB & GUTTER DETAIL

1" = 1'-0"



MONOLITHIC CURB AND WALK DETAIL

NO SCALE

NOTES:

1. CURB SHALL HAVE 1/2" EXPANSION JOINTS AT 48'-0" MAX. AND AT ENDS OF RADII. CONTROL JOINTS AT 6'-0" MAX. UNLESS OTHERWISE NOTED ON PLANS.
2. CONTROL JOINTS SHALL BE CUT 1/4 DEPTH OF TOTAL THICKNESS OF SLAB.



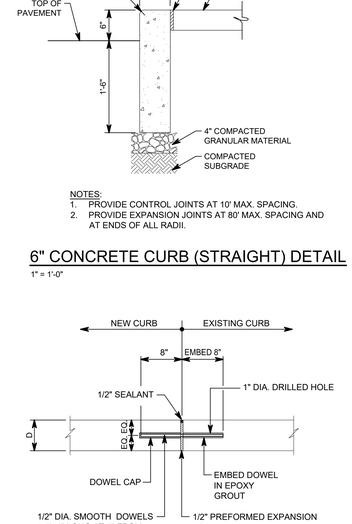
EXPANSION JOINT - "EJ" CONTROL JOINT - "CJ"

NOTE:

1. CONSTRUCT EXPANSION JOINTS @ 40' MAX. AND CONTROL JOINTS @ 10' MAX. UNLESS OTHERWISE NOTED.
2. JOINT SEALANT SHALL BE FUEL RESISTANT, TRAFFIC GRADE, POLYSULFIDE, THIOKOL 2282 OR EQUAL SEALANT PER FEDERAL SPECIFICATION SS-S-200E

CONCRETE PAVEMENT JOINT DETAILS

NO SCALE

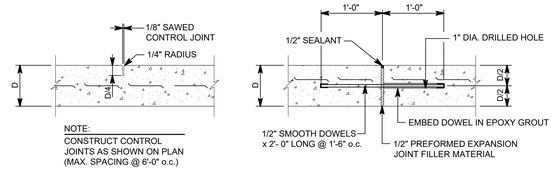


NOTES:

1. PROVIDE CONTROL JOINTS AT 10' MAX. SPACING.
2. PROVIDE EXPANSION JOINTS AT 80' MAX. SPACING AND AT ENDS OF ALL RADII.

6" CONCRETE CURB (STRAIGHT) DETAIL

1" = 1'-0"

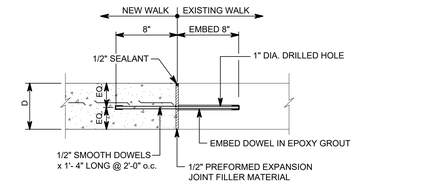


CONCRETE SIDEWALK CONTROL JOINT DETAIL

NO SCALE

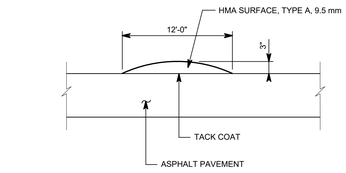
CONCRETE CURB CONNECTION DETAIL

1" = 1'-0"



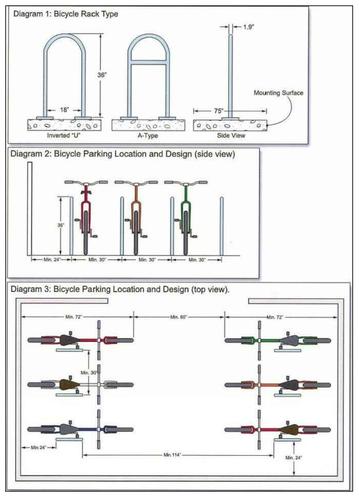
CONCRETE SIDEWALK CONSTRUCTION JOINT DETAIL - (CJ)

1 1/2" = 1'-0"



ASPHALT SPEED CONTROL BUMP

NO SCALE



NOTE:

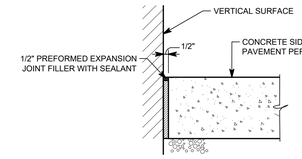
INSTALLATION OF BIKE RACKS TO BE SEPARATE CONSTRUCTION CONTRACT.

BIKE RACK DETAIL

NO SCALE

PAVEMENT ISOLATION JOINT DETAIL - (IJ)

1/2" = 1'-0"



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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSULTANT

TLF

CONSTRUCTION DOCUMENTS

PETE MILLMIER RANDOLPH REGISTERED No. 19700317 STATE OF INDIANA PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR
DRAWN BY: HHW
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO/△	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE DETAILS

G4.1

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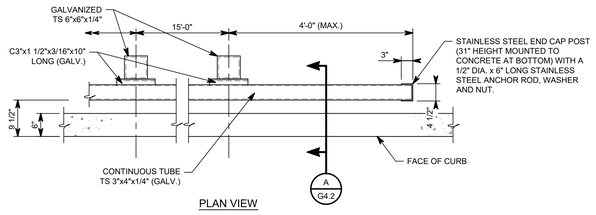
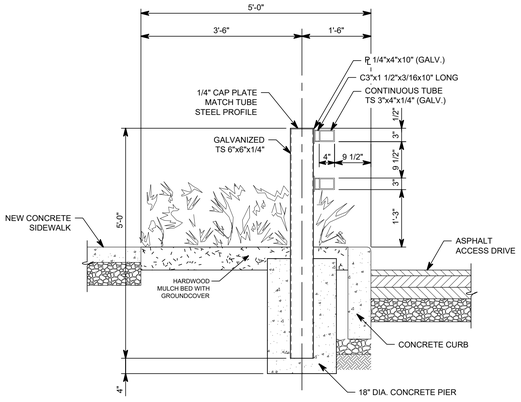
Plotted By: hwindhorst Time of Plot: 1/21/22 - 10:49am Last Edited: 1/21/22 - 9:39am



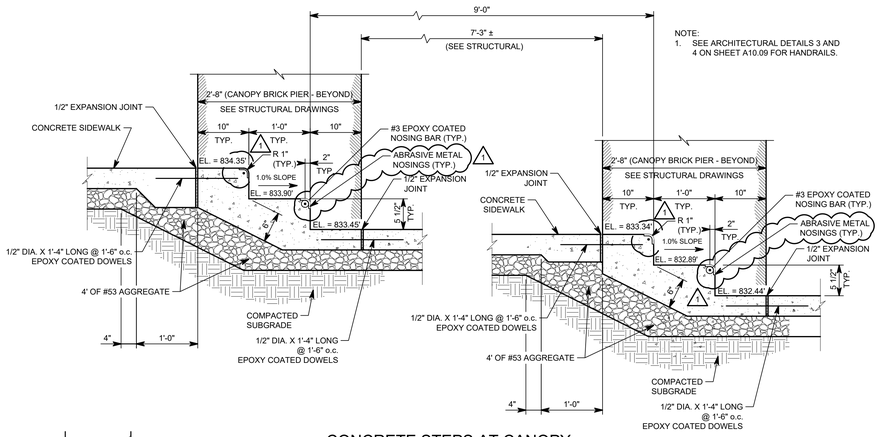
PLAN VIEW



SECTION A

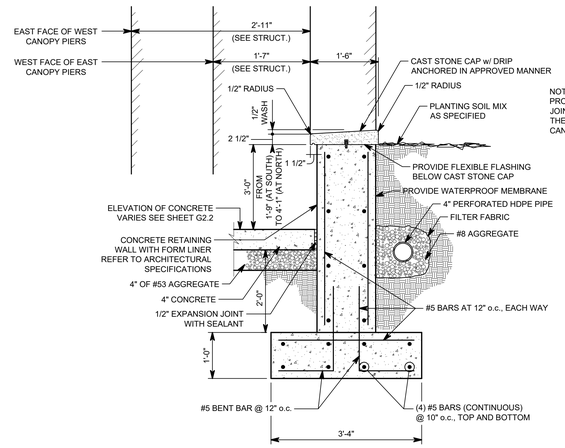
GUARDRAIL (TYPE 1) ALONG NORTH ACCESS ROAD

3/4" = 1'-0"



CONCRETE STEPS AT CANOPY

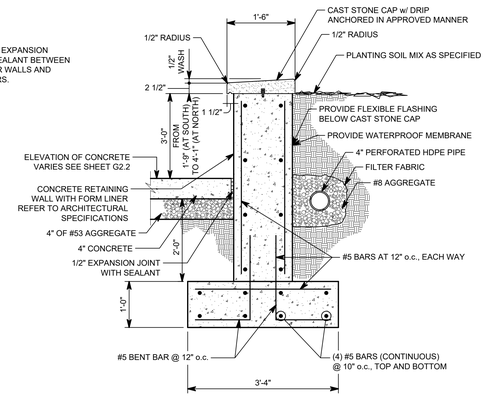
1" = 1'-0"



PLANTER WALL SECTIONS AT CANOPY PIER

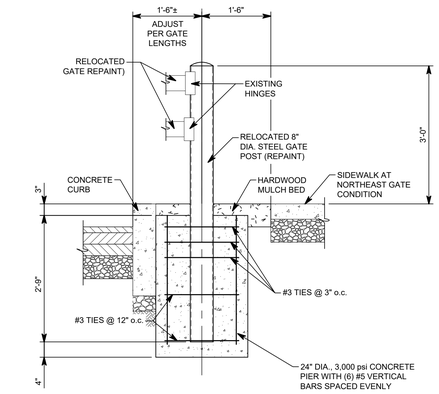
3/4" = 1'-0"

NOTE:
PROVIDE 1/2" EXPANSION
JOINT AND SEALANT BETWEEN
THE PLANTER WALLS AND
CANOPY PIERS.



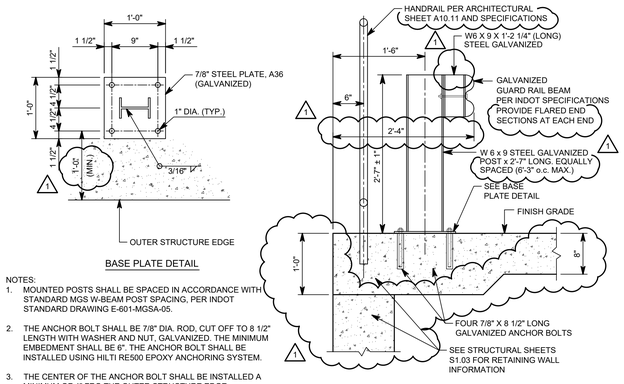
PLANTER WALL SECTIONS

3/4" = 1'-0"



RELOCATED GATE POST

3/4" = 1'-0"



BASE PLATE DETAIL

NOTES:
1. MOUNTED POSTS SHALL BE SPACED IN ACCORDANCE WITH STANDARD MCS W-BEAM POST SPACING, PER INDOT STANDARD DRAWING E-601-MGSA-05.
2. THE ANCHOR BOLT SHALL BE 7/8" DIA. ROD, CUT OFF TO 8 1/2" LENGTH WITH WASHER AND NUT, GALVANIZED. THE MINIMUM EMBEDMENT SHALL BE 6". THE ANCHOR BOLT SHALL BE INSTALLED USING HILTI RE500 EPOXY ANCHORING SYSTEM.
3. THE CENTER OF THE ANCHOR BOLT SHALL BE INSTALLED A MINIMUM OF 4" FRO THE OUTER STRUCTURE EDGE.

HIGHWAY GUARDRAIL TYPE 2

NO SCALE

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520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSULTANT

TLF

CONSTRUCTION DOCUMENTS

PETE M. LOMIR RAMOVICH
REGISTERED
No. 19700317
STATE OF INDIANA
PROFESSIONAL ENGINEER

PROJECT MANAGER: PMR

DRAWN BY: HHW

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.△	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SITE DETAILS

G4.2

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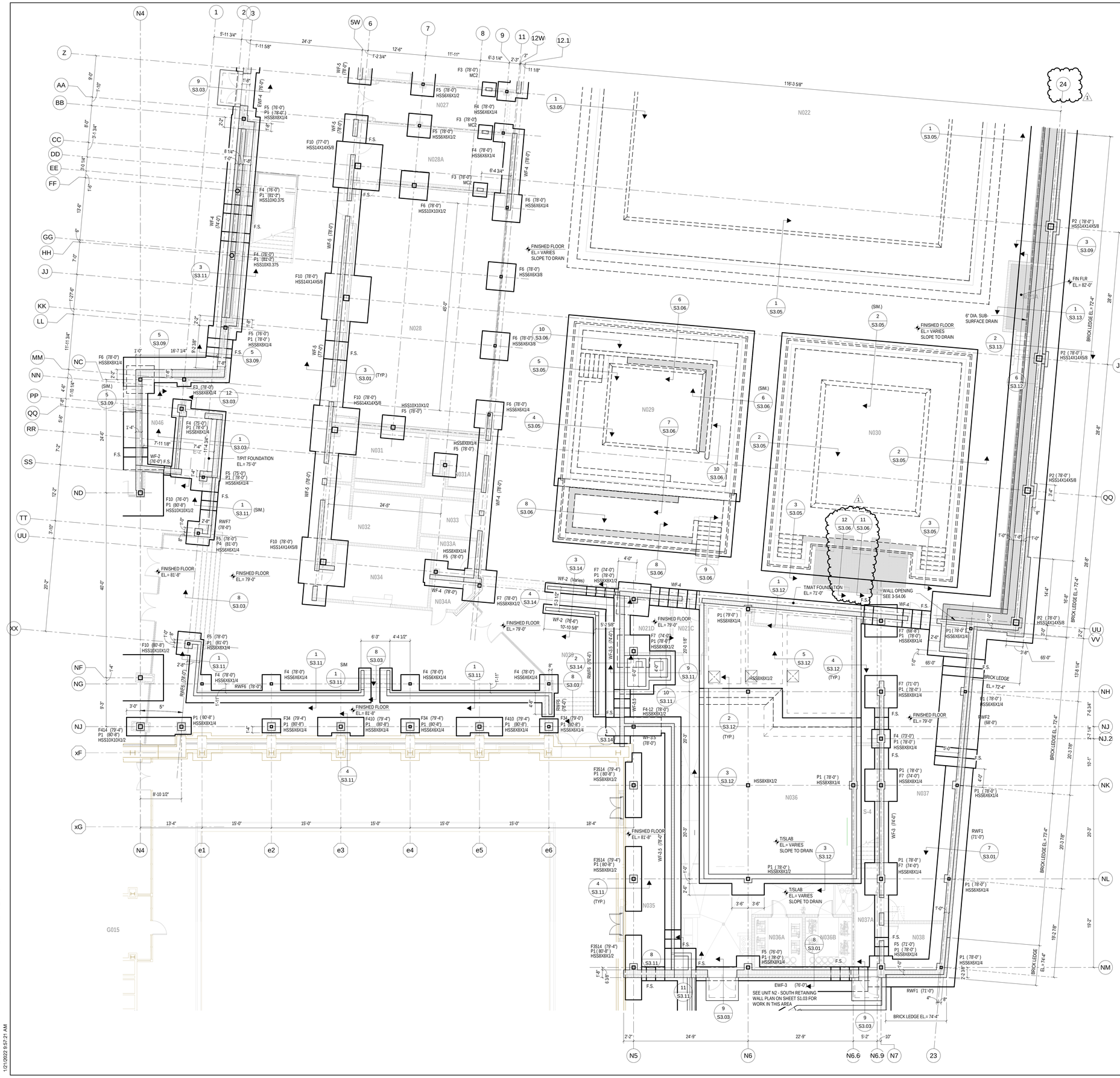

UNIT N2 - FOUNDATION PLAN

1/8" = 1'-0"

NORTH

PLAN NOTES:

1. REFERENCE ELEVATION = TOP OF FINISH FLOOR = 79'-0" (831.98' U.S.G.S.).
2. (XXX'-X") INDICATES TOP OF FOOTING OR PIER ELEVATION.

FOUNDATION PLAN GENERAL NOTES:

1. SEE SHEET S0.01 FOR GENERAL NOTES.
2. SEE S3.01 THROUGH S3.03 FOR FOUNDATION DETAILS. TYPICAL DETAILS MAY NOT BE CUT ON PLANS, BUT APPLY UNLESS OTHERWISE NOTED.
3. CENTER WALL FOOTINGS UNDER WALLS UNLESS NOTED OTHERWISE.
4. FX, EFX INDICATES FOUNDATION F"X" OR EF"X". SEE FOUNDATION SCHEDULE ON S3.01.
5. RWFX INDICATES RETAINING WALL FOOTING RWF"X". SEE TYPICAL RETAINING WALL DETAIL ON S3.01.
6. EWF-X INDICATES EXTERIOR WALL FOOTING EWF-"X". SEE TYPICAL EXTERIOR WALL FOOTING DETAIL ON S3.01.
7. WF-X, INDICATES INTERIOR WALL FOOTING WF-"X". TYPICAL INTERIOR WALL FOOTING DETAIL ON S3.01.
8. P1, P2, ETC. INDICATES CONCRETE PIER. SEE TYPICAL PIER DETAIL ON S3.01.
9. SEE S3.01 FOR TYPICAL INTERIOR COLUMN FOOTING DETAIL
10. F.S. INDICATES STEPPED FOOTING. SEE S3.02 FOR DETAILS. (INDICATES TOP OF FOOTING ELEVATION)
11. SEE 5-S3.01 FOR TYPICAL COLUMN BASE.
12. SEE 6-S3.01 FOR TYPICAL BASE PLATE.
13. FOOTINGS MAY BE EARTH-FORMED WHERE COHESIVE SOILS EXIST AT FOUNDATION ELEVATION. REFER TO THE PROJECT MANUAL. THE CONTRACTOR SHALL INCLUDE IN BID FORMING OF FOOTINGS WHERE REVIEW OF THE GEOTECHNICAL ENGINEERING REPORT INDICATES EARTH-FORMING MAY NOT BE POSSIBLE.
14. VERIFY LOCATION AND ELEVATION OF ALL UNDERGROUND PLUMBING LINES. SEE SHEET S3.02 FOR REQUIREMENTS WHEN PLUMBING LINES CROSS FOUNDATIONS AT ALL ELEVATIONS.
15. LEGEND:

INDICATES MASONRY WALL SUPPORTED ON FOOTING.

INDICATES THICKENED SLAB. SEE 6C-S3.03.

FINISHED FLOOR EL. - XX'-XX" INDICATES FINISHED FLOOR ELEVATION. TOP OF SLAB TO BE DEPRESSED PER DETAIL 5-S3.04 AS REQUIRED TO ACCOMMODATE FINAL FLOOR FINISH THICKNESS. COORDINATE SLAB DEPRESSIONS WITH ARCHITECTURAL FINISH PLANS.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

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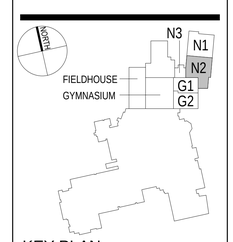

KEY PLAN

CONSTRUCTION DOCUMENTS

RICHARD ALLEN JUDD REGISTERED No. 890059 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: TLF

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

UNIT N2 - FOUNDATION PLAN

S1.02

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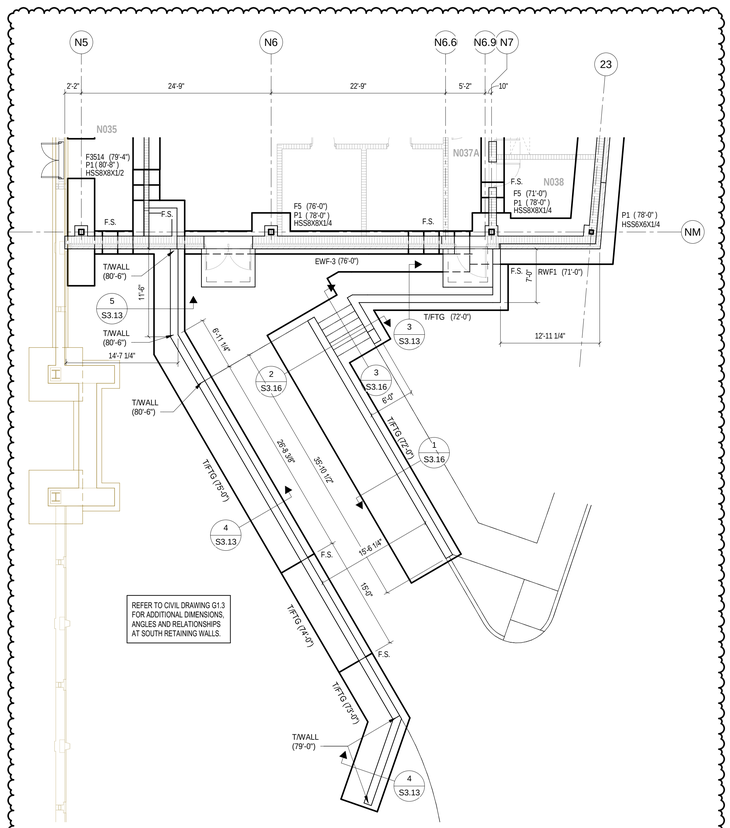
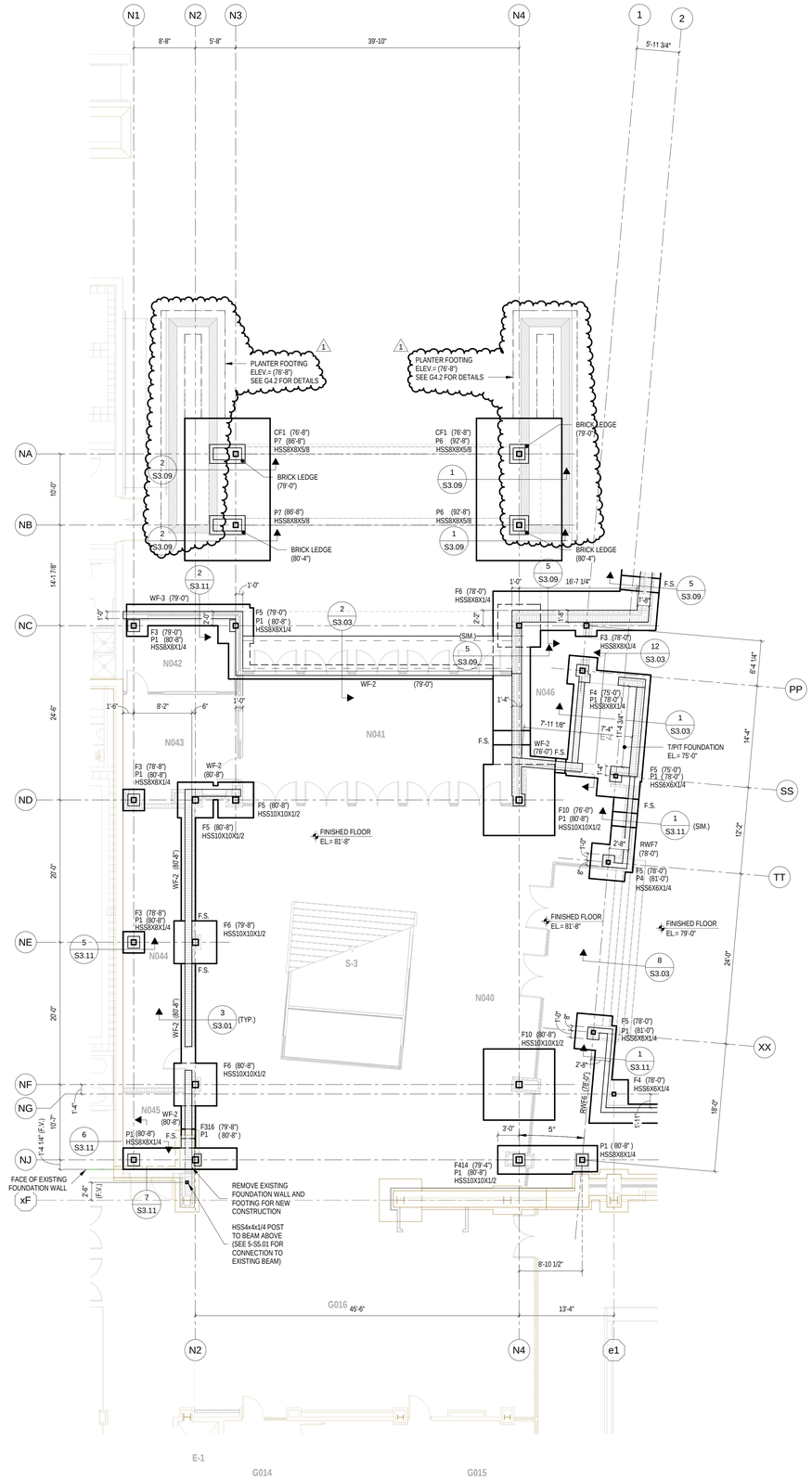


UNIT N2 - SOUTH RETAINING WALL PLAN

1/8" = 1'-0"

NORTH



UNIT N3 - FOUNDATION PLAN

1/8" = 1'-0"

NORTH

PLAN NOTES:

1. REFERENCE ELEVATION = TOP OF FINISH FLOOR = **81'-8"** (834.65' U.S.G.S.).
2. (XXX'-X") INDICATES TOP OF FOOTING OR PIER ELEVATION.

FOUNDATION PLAN GENERAL NOTES:

1. SEE SHEET S0.01 FOR GENERAL NOTES.
2. SEE S3.01 THROUGH S3.03 FOR FOUNDATION DETAILS. TYPICAL DETAILS MAY NOT BE CUT ON PLANS, BUT APPLY UNLESS OTHERWISE NOTED.
3. CENTER WALL FOOTINGS UNDER WALLS UNLESS NOTED OTHERWISE.
4. FX, EFX INDICATES FOUNDATION F"X" OR EF"X". SEE FOUNDATION SCHEDULE ON S3.01.
5. RWFX INDICATES RETAINING WALL FOOTING RWF"X". SEE TYPICAL RETAINING WALL DETAIL ON S3.01.
6. EWF-X INDICATES EXTERIOR WALL FOOTING EWF-"X". SEE TYPICAL EXTERIOR WALL FOOTING DETAIL ON S3.01.
7. WF-X, INDICATES INTERIOR WALL FOOTING WF-"X". TYPICAL INTERIOR WALL FOOTING DETAIL ON S3.01.
8. P1, P2, ETC. INDICATES CONCRETE PIER. SEE TYPICAL PIER DETAIL ON S3.01.
9. SEE S3.01 FOR TYPICAL INTERIOR COLUMN FOOTING DETAIL
10. F.S. INDICATES STEPPED FOOTING. SEE S3.02 FOR DETAILS. (INDICATES TOP OF FOOTING ELEVATION)
11. SEE S-S3.01 FOR TYPICAL COLUMN BASE.
12. SEE 6-S3.01 FOR TYPICAL BASE PLATE.
13. FOOTINGS MAY BE EARTH-FORMED WHERE COHESIVE SOILS EXIST AT FOUNDATION ELEVATION. REFER TO THE PROJECT MANUAL. THE CONTRACTOR SHALL INCLUDE IN BID FORMING OF FOOTINGS WHERE REVIEW OF THE GEOTECHNICAL ENGINEERING REPORT INDICATES EARTH-FORMING MAY NOT BE POSSIBLE.
14. VERIFY LOCATION AND ELEVATION OF ALL UNDERGROUND PLUMBING LINES. SEE SHEET S3.02 FOR REQUIREMENTS WHEN PLUMBING LINES CROSS FOUNDATIONS AT ALL ELEVATIONS.
15. LEGEND:

INDICATES MASONRY WALL SUPPORTED ON FOOTING.

INDICATES THICKENED SLAB. SEE 6C-S3.03.

FINISHED FLOOR EL - XX'-XX" INDICATES FINISHED FLOOR ELEVATION. TOP OF SLAB TO BE DEPRESSED PER DETAIL 5-S3.04 AS REQUIRED TO ACCOMMODATE FINAL FLOOR FINISH THICKNESS. COORDINATE SLAB DEPRESSIONS WITH ARCHITECTURAL FINISH PLANS.

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

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CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

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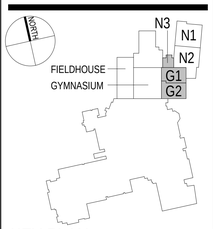

KEY PLAN

CONSTRUCTION DOCUMENTS

RICHARD ALLEN JOHNSON
PRODUCED BY REGISTERED
No. 890059
STATE OF
INDIANA
PROFESSIONAL ENGINEER

DRAWN BY: TLF

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

UNIT N3 - FOUNDATION PLAN / UNIT N2 - SOUTH RETAINING WALL PLAN

S1.03

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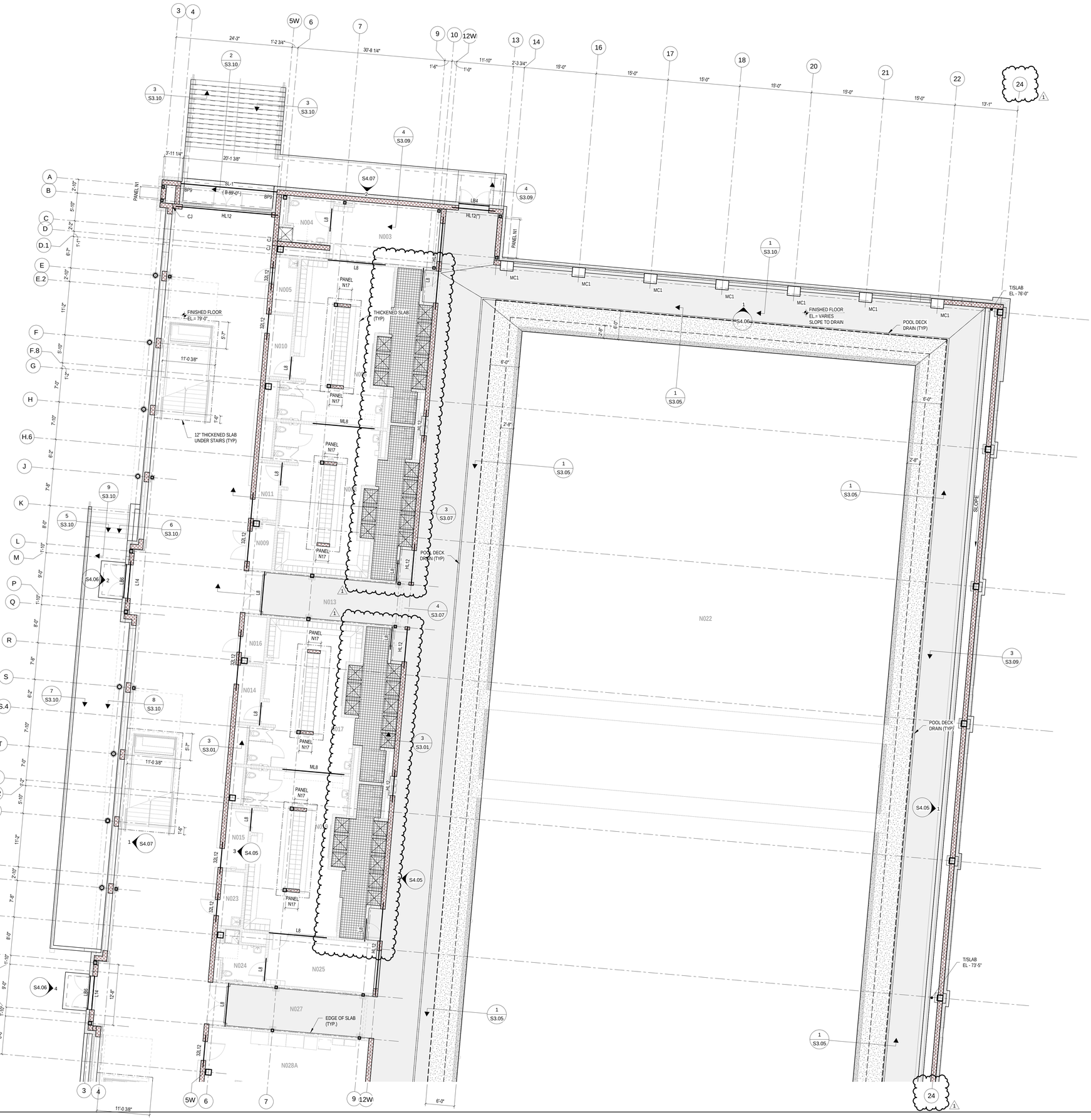

UNIT N1 - SLAB AND MASONRY PLAN

1/8" = 1'-0"

NORTH

PLAN NOTES:

1. REFERENCE ELEVATION = TOP OF FINISH FLOOR = 79'-0" (831.98' U.S.G.S.).

SLAB AND MASONRY PLAN GENERAL NOTES:

1. SEE SHEET S0.01 FOR GENERAL NOTES.
2. SEE S3.03, S3.04 AND S4.01 THROUGH S4.04 FOR TYPICAL SLAB AND MASONRY DETAILS. TYPICAL DETAILS MAY NOT BE CUT ON PLANS, BUT APPLY UNLESS OTHERWISE NOTED.
3. L, ML, SML — INDICATES MASONRY LINTEL. SEE SHEET S4.04.
4. LBX — INDICATES STEEL ANGLE LINTEL. SEE SHEET S4.04.
5. MC — INDICATES MASONRY COLUMN. SEE SHEET S4.01.
6. xxLxx — INDICATES NOMINAL HEIGHT AND WIDTH OF MASONRY LINTEL. (I.E. 32L12 EQUALS 32" TALL BY 12" WIDE LINTEL) SEE 3-S4.04 FOR REINFORCEMENT.
7. SEE THE PROJECT MANUAL FOR CONTRACTION AND CONSTRUCTION JOINT SPACING. THE CONTRACTOR IS ENCOURAGED TO SUBMIT A SLAB PLAN SHOWING ALTERNATE SPACINGS AND LOCATIONS THAT ADAPTS TO THEIR PLANNED CONSTRUCTION SEQUENCE.
8. SEE ARCHITECTURAL PLANS FOR RAISED LOCKER BASES.
9. PROVIDE C8x11.5 CHANNEL LINTEL x OPENING WIDTH PLUS 6" AT EACH END WITH (2)-3/4" DIA. HILTI HIT-HY ANCHORS 4" FROM OPENING (EMBED 4"). T/CHANNEL IS AT UNDERSIDE OF EXISTING FLOOR SLAB (EL.= 111'-8"±).
10. LEGEND:

INDICATES EXTENTS OF NEW 6" THICK CONCRETE SLAB ON GRADE. REINFORCE WITH #4 BARS AT 12"o.c. IN EACH DIRECTION. PLACE SLAB OVER 6" OF COMPACTED GRANULAR FILL.

INDICATES PORTIONS OF THE POOL AREA SLAB THAT SHALL BE 12" OR 18" THICK (SEE SECTIONS) WITH TWO LAYERS OF #5 BARS AT 12"o.c. IN EACH DIRECTION.

INDICATES DEPRESSED FLOOR SLAB FOR THICKSET TILE (SEE ARCHITECTURAL PLANS)

PANEL XX — INDICATES MASONRY WALL SUPPORTED ON FOOTING. SEE MASONRY WALL PANEL SCHEDULE ON SHEET S4.01.

INDICATES THICKENED SLAB. SEE 6C-S3.03.

FINISHED FLOOR EL= XXX'-XX" — INDICATES FINISHED FLOOR ELEVATION. TOP OF SLAB TO BE DEPRESSED PER DETAIL 5-S3.04 AS REQUIRED TO ACCOMMODATE FINAL FLOOR FINISH THICKNESS. COORDINATE SLAB DEPRESSIONS WITH ARCHITECTURAL FINISH PLANS AND POOL PLANS.

INDICATES RECESSED SLAB FOR THICKSET TILE.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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ARCHITECT

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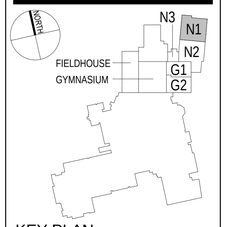

KEY PLAN

CONSTRUCTION DOCUMENTS

RICHARD ALLEN HOWEY REGISTERED No. 890059 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: TLF

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

UNIT N1 - LOWER LEVEL SLAB AND MASONRY PLAN

S1.04

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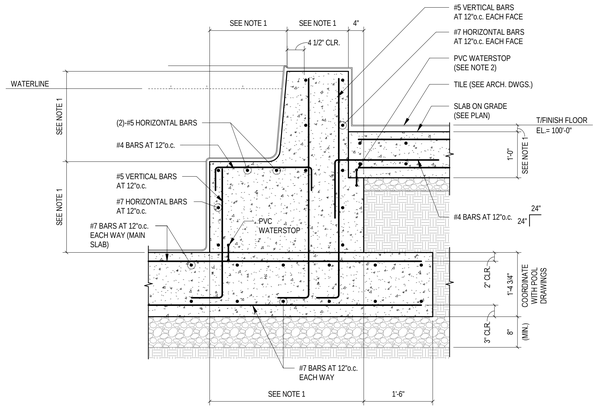
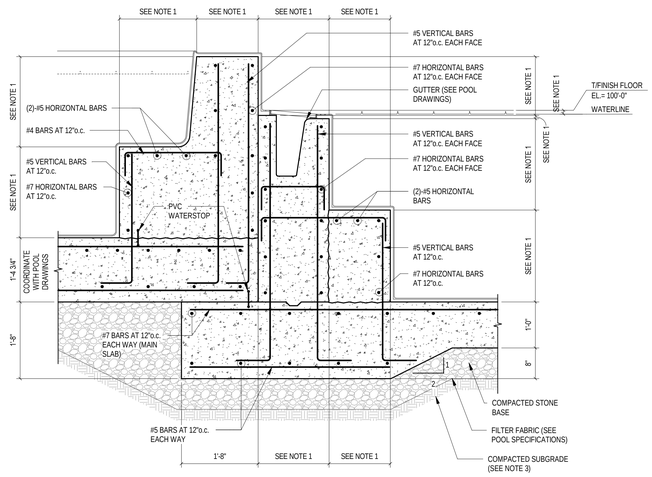


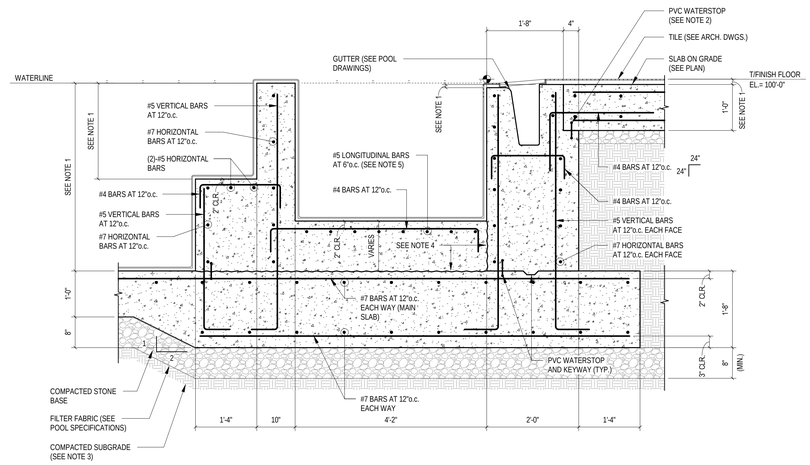
8 POOL SECTION

SCALE: 3/4" = 1'-0"



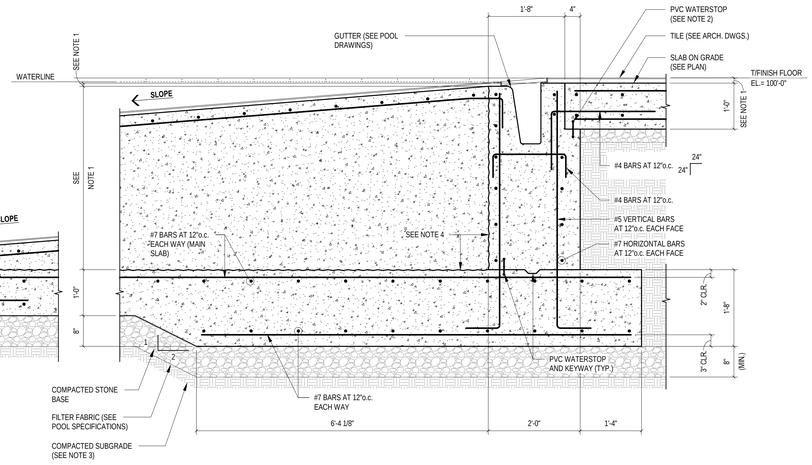
7 POOL SECTION

SCALE: 3/4" = 1'-0"



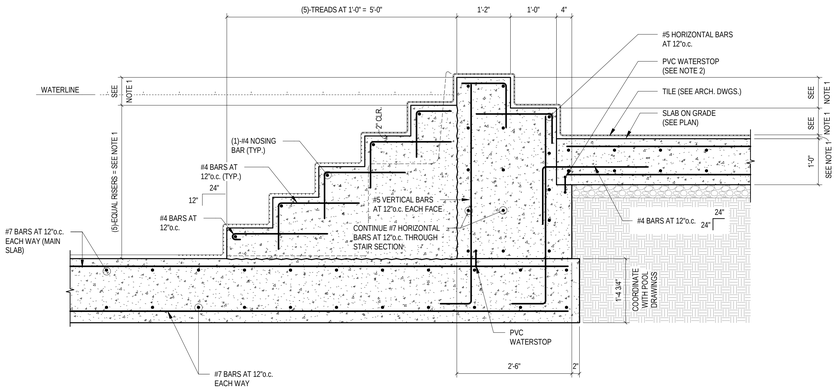
6 POOL SECTION

SCALE: 3/4" = 1'-0"



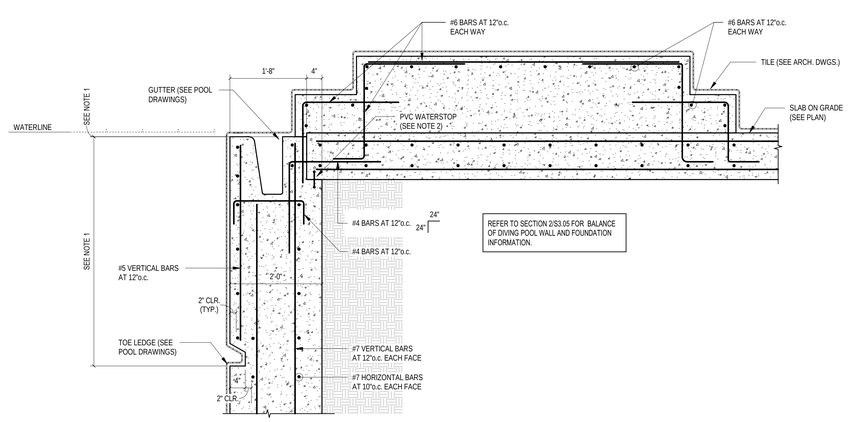
10 POOL SECTION

SCALE: 3/4" = 1'-0"



9 POOL SECTION

SCALE: 3/4" = 1'-0"



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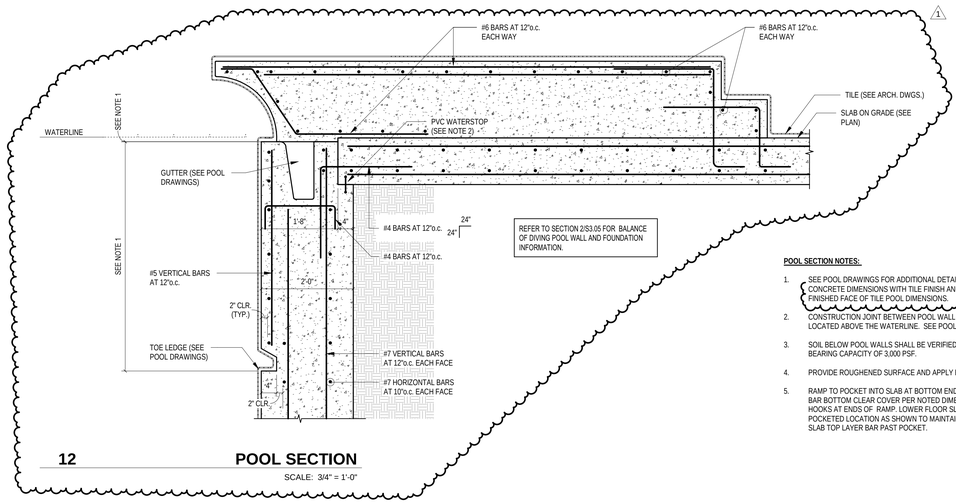

12 POOL SECTION

SCALE: 3/4" = 1'-0"

POOL SECTION NOTES:

1. SEE POOL DRAWINGS FOR ADDITIONAL DETAILS AND DIMENSIONS. COORDINATE OVERALL CONCRETE DIMENSIONS WITH TILE FINISH AND SETTING BED TO ENSURE CORRECT FINISHED FACE OF TILE POOL DIMENSIONS. 1
2. CONSTRUCTION JOINT BETWEEN POOL WALL AND SLAB SHALL BE A HORIZONTAL JOINT LOCATED ABOVE THE WATERLINE. SEE POOL DETAILS.
3. SOIL BELOW POOL WALLS SHALL BE VERIFIED BY TESTING AGENCY TO HAVE A MINIMUM BEARING CAPACITY OF 3,000 PSF.
4. PROVIDE ROUGHENED SURFACE AND APPLY BONDING AGENT BETWEEN POURS.
5. RAMP TO POCKET INTO SLAB AT BOTTOM END OF RAMP TO MAINTAIN RAMP LONGITUDINAL BAR BOTTOM CLEAR COVER PER NOTED DIMENSIONS. TERMINATE BAR WITH 90° DOWELED HOOKS AT ENDS OF RAMP. LOWER FLOOR SLAB TOP LAYER REINFORCEMENT AT POCKETED LOCATION AS SHOWN TO MAINTAIN CLEAR COVER. FULLY DEVELOP LOWERED SLAB TOP LAYER BAR PAST POCKET.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

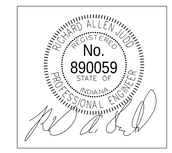
FANNING HOWEY

317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

TLF

CONSTRUCTION DOCUMENTS



DRAWN BY: TLF

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

POOL SECTIONS

S3.06

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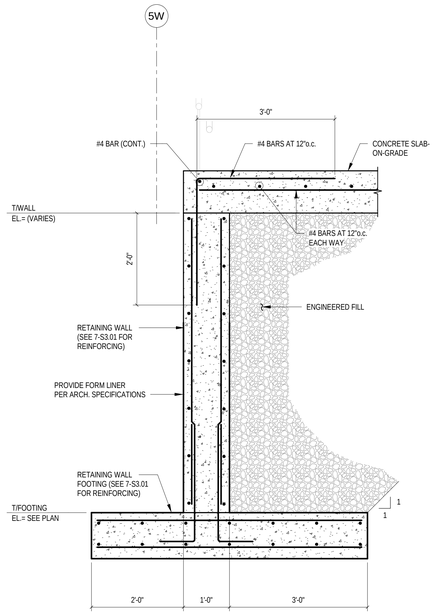

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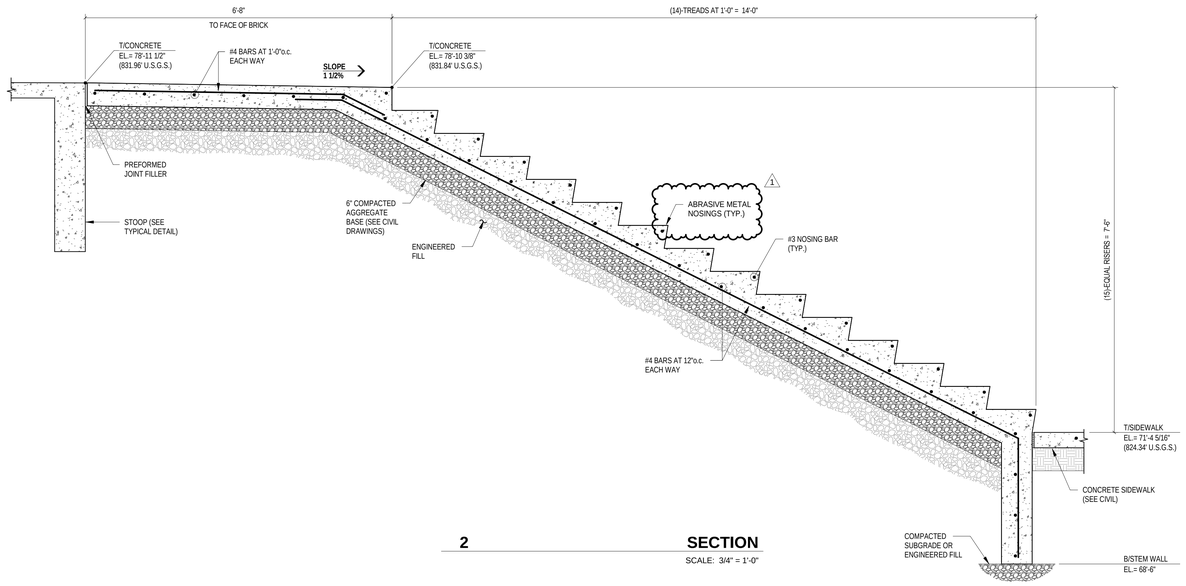

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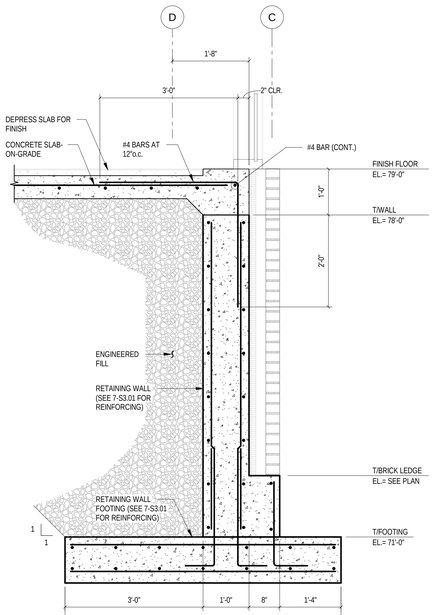

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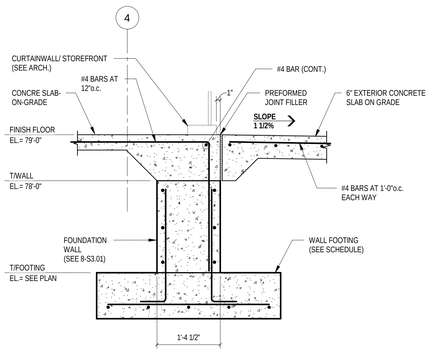

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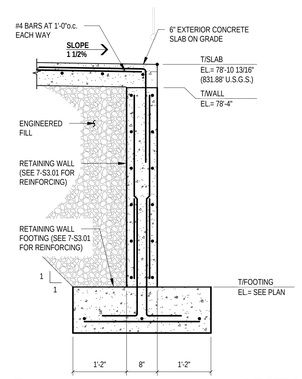

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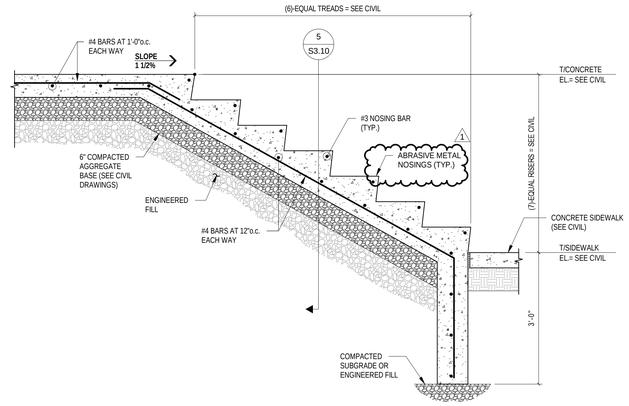

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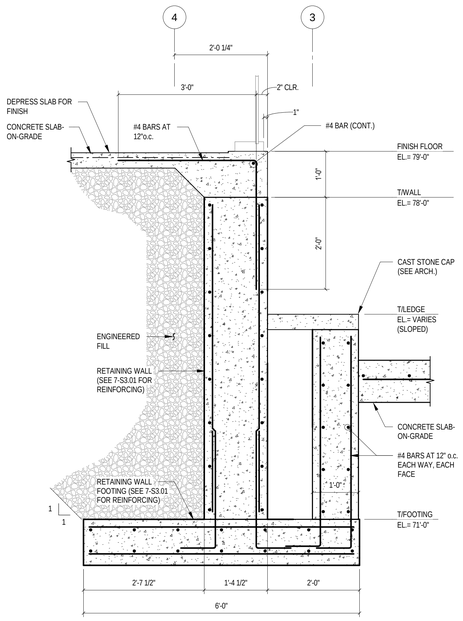

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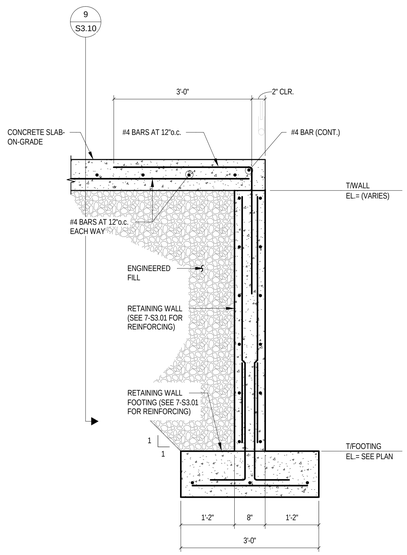

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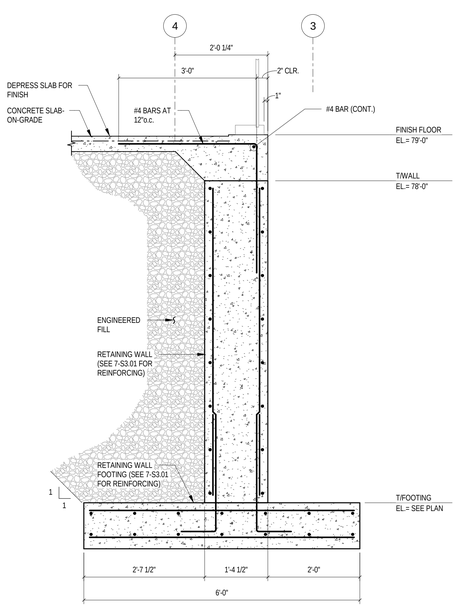
SCALE: 3/4" = 1'-0"



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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

TLF

CONSTRUCTION DOCUMENTS

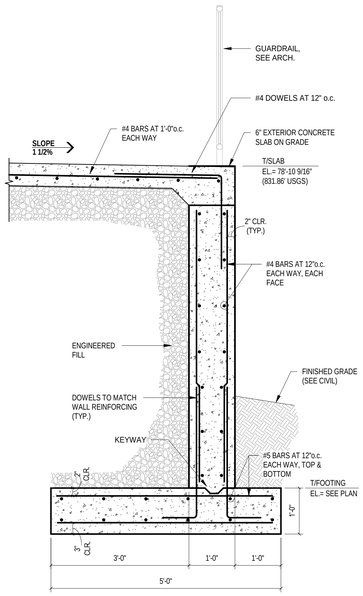
RICHARD ALLEN JOHNSON REGISTERED No. 890059 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: TLF
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

SECTIONS AND DETAILS

S3.10



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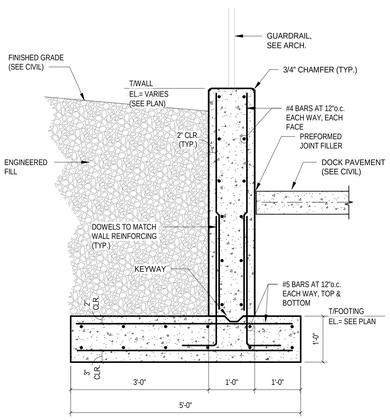
SCALE: 3/4" = 1'-0"



4 SECTION

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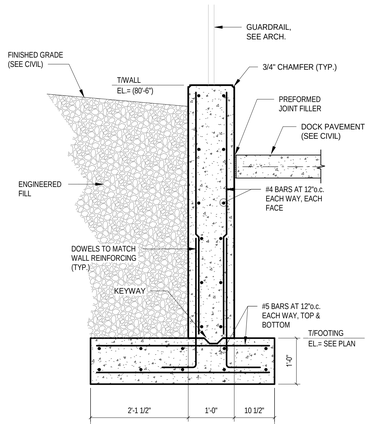

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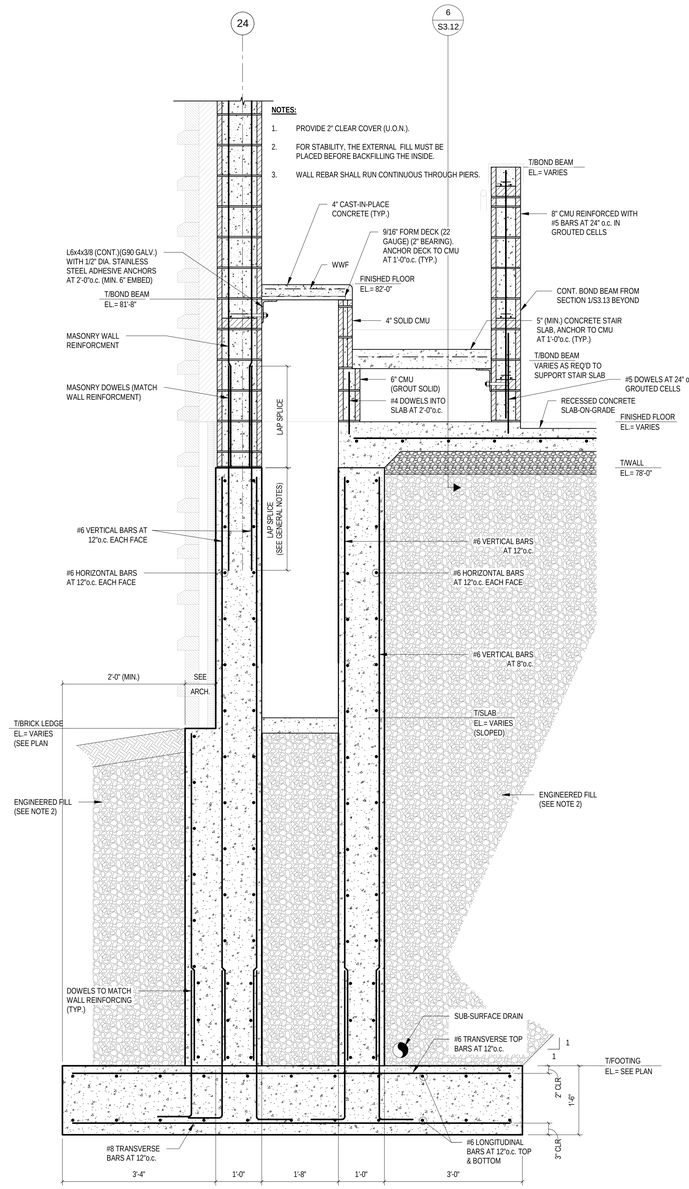

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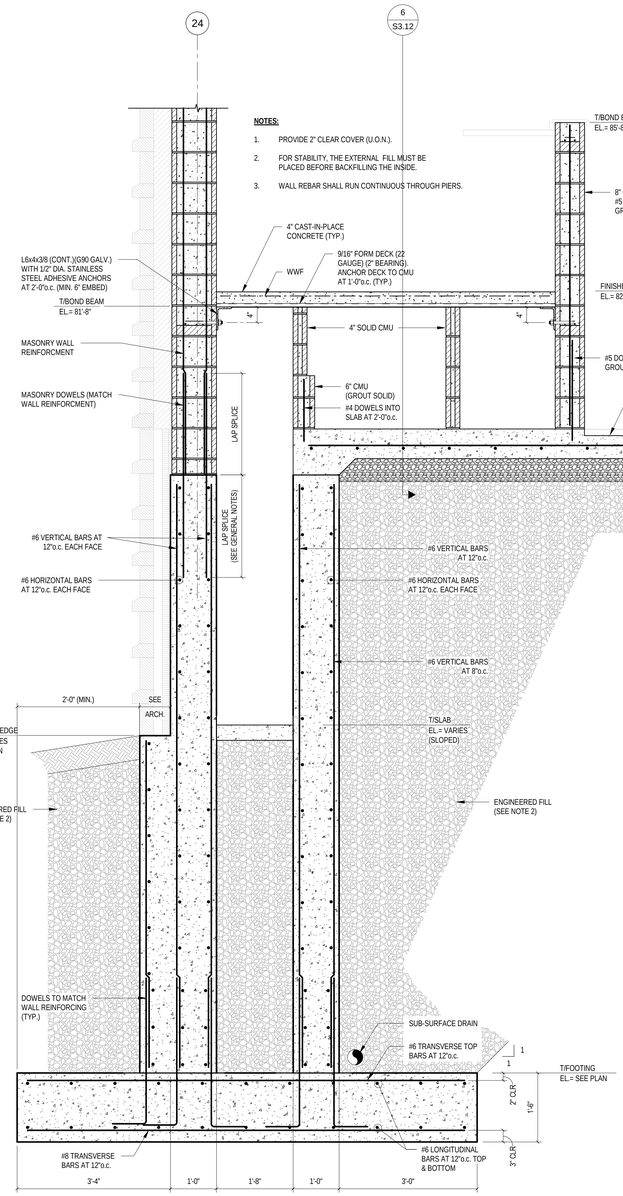

1 SECTION

SCALE: 3/4" = 1'-0"

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520 E MAIN STREET
CARMEL, IN 46032

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ARCHITECT

FANNING HOWEY

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

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CONSTRUCTION DOCUMENTS

RICHARD ALLEN HOWEY REGISTERED No. 890059 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: TLF

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

SECTIONS AND DETAILS

S3.13

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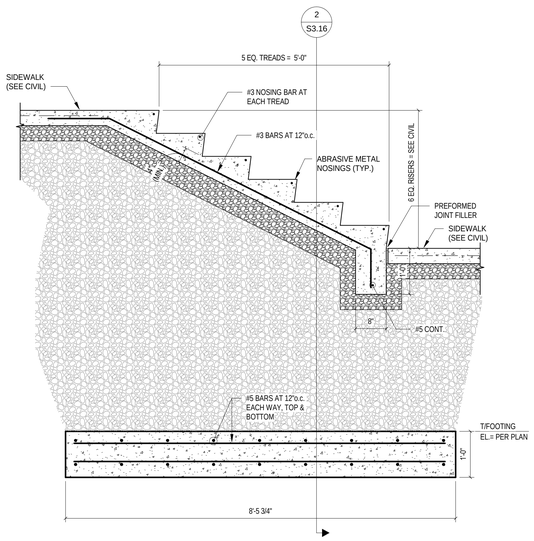

3 **SECTION**

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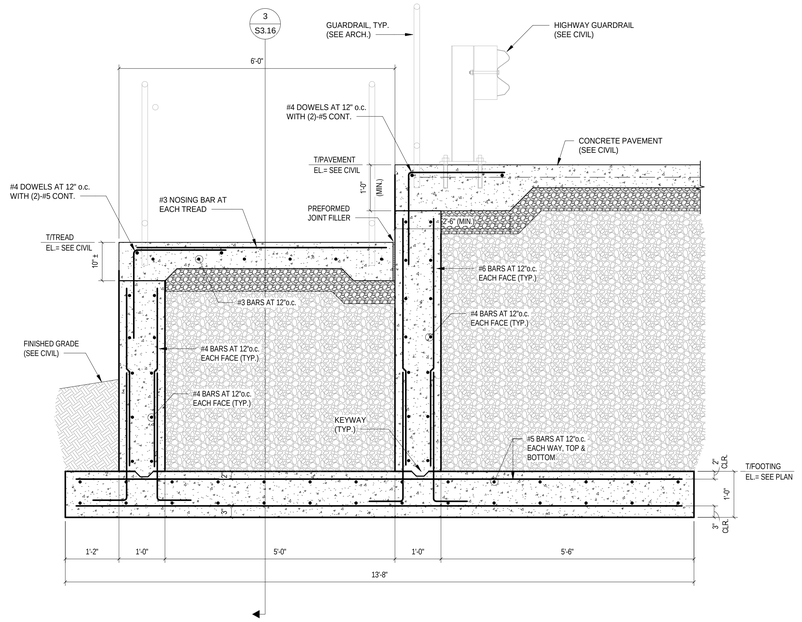

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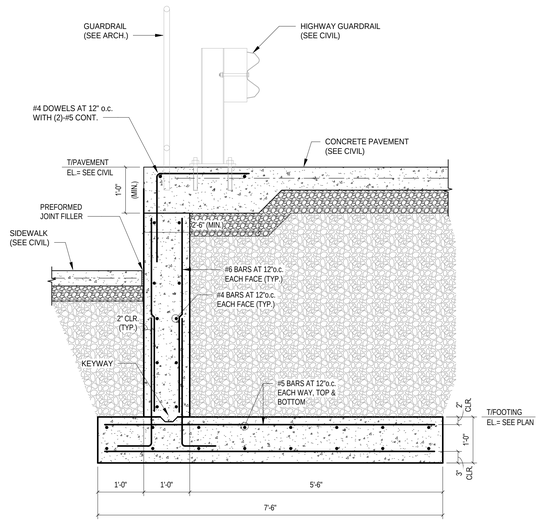

1 **SECTION**

SCALE: 3/4" = 1'-0"

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CONSTRUCTION DOCUMENTS

RICHARD ALLEN JOY
REGISTERED
No.
890059
STATE OF
INDIANA
PROFESSIONAL ENGINEER

DRAWN BY: TAC

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.22

SECTIONS AND DETAILS

S3.16

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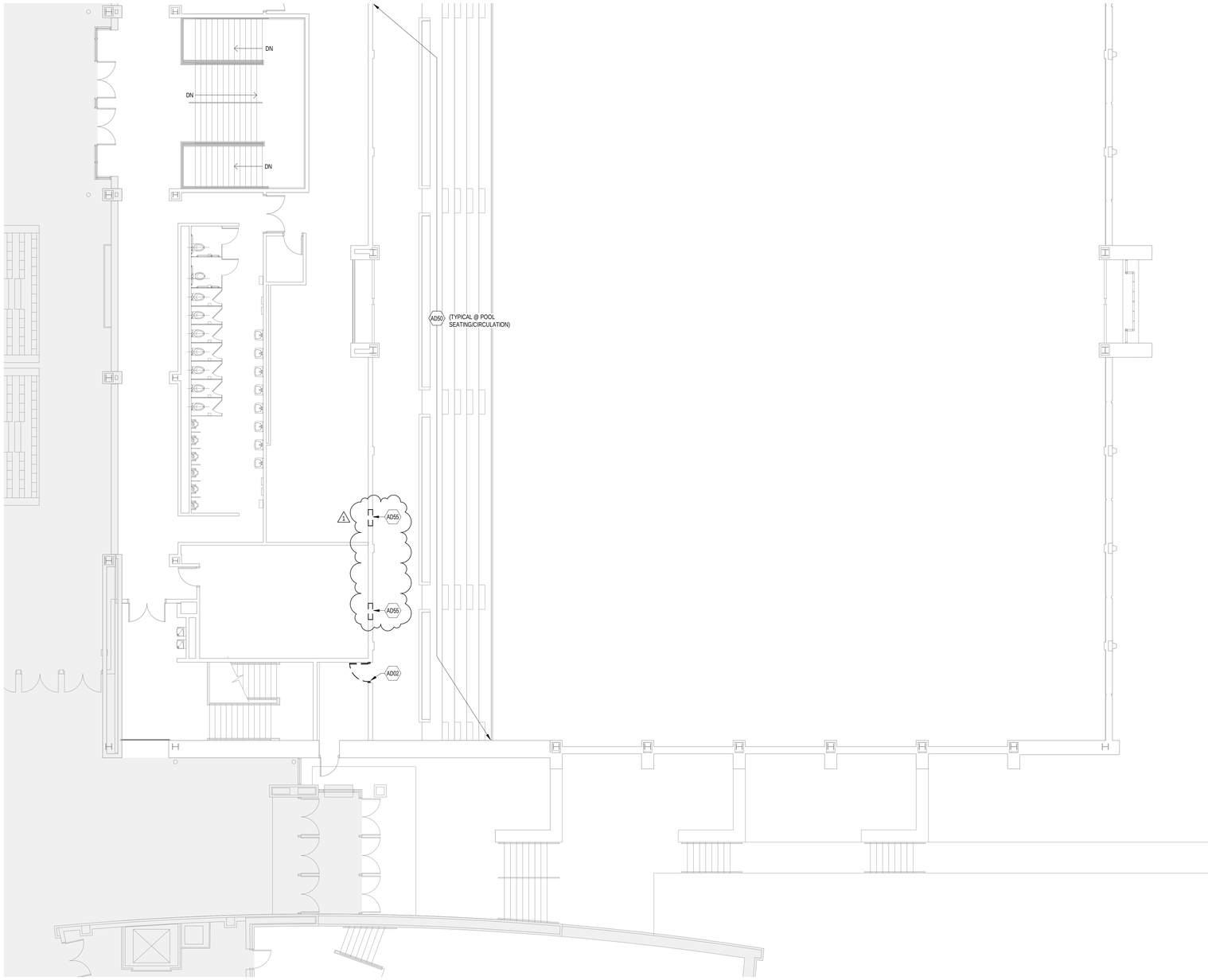

UNIT G2 - FIRST FLOOR - DEMOLITION PLAN

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

ARCHITECTURAL DEMOLITION GENERAL NOTES

A. DEMOLITION IS TO FOLLOW ESTABLISHED CONSTRUCTION SEQUENCE. CONTRACTOR IS TO VERIFY THEIR WORK IN THE FIELD WITH THE DEMOLITION DRAWINGS, NEW CONSTRUCTION DRAWINGS, AND THE EXISTING IN-FIELD CONDITIONS. REPORT DISCREPANCIES TO THE ARCHITECT.
B. "FLOORING" DENOTES FLOOR COVERING MATERIALS INCLUDING BACKINGS, ADHESIVES, BASES, DOWN TO BUT EXCLUSIVE OF FLOOR SLABS AND STRUCTURAL MATERIALS, UNLESS NOTED OTHERWISE.
C. "CEILING" DENOTES CEILING MATERIALS INCLUDING SUSPENSION SYSTEMS ADHESIVE RESIDUES, MOLDINGS, UP TO BUT EXCLUSIVE OF STRUCTURAL MATERIALS.
D. WALLS TO BE REMOVED SHALL BE REMOVED TO A POINT 2" (MIN.) BELOW THE EXISTING FLOOR SLAB (UNLESS SETTING ON SLAB). PATCH WITH NEW CONCRETE TO BE FLUSH WITH THE EXISTING FLOOR SLAB.
E. WHEN OPENINGS ARE CUT INTO AN EXISTING WALL, THE OPENING SHALL BE A MINIMUM OF 1'-4" LONGER THAN THE FINISHED OPENING REQUIRED TO ALLOW FOR 8" (MIN) OF NEW CMU TOOTHED-IN AT EDGES.
F. AFTER THE DEMOLITION OF MATERIALS, THE RESULTING EXPOSED SURFACE SHALL BE SMOOTH AND FLUSH WITH EXISTING CONDITIONS.
G. MECHANICAL AND ELECTRICAL ITEMS THAT ARE CAPPED AND ABANDONED SHALL BE LOCATED BEHIND FINAL FINISH SYSTEMS.
H. COORDINATE THIS WORK WITH DEMOLITION WORK ON SITE, STRUCTURAL, PLUMBING, MECHANICAL, AND ELECTRICAL.
I. PROVIDE INTERIOR AND EXTERIOR SHORING, BRACING, OR SUPPORT TO PREVENT MOVEMENT OR SETTLEMENT OF EXISTING STRUCTURES.
J. CONTRACTOR TO FIELD VERIFY PORTIONS OR SECTIONS OF EXISTING WALLS TO BE FILLED IN AND SALVAGE NECESSARY MATERIAL.
K. MATERIALS OF DEMOLITION SHALL BE DISPOSED OF OFF-SITE UNLESS OTHERWISE DIRECTED BY OWNER.
L. OWNER TO REMOVE EXISTING FURNITURE AND MISCELLANEOUS ITEMS NOT SHOWN AND NOT TO BE DEMOLISHED. CONTRACTOR TO NOTIFY OWNER IN ADVANCE WHEN ITEMS NEED TO BE REMOVED. CONTRACTOR IS RESPONSIBLE FOR OTHER ITEMS TO BE REMOVED.
M. ITEMS TO BE PATCHED. REMOVE ALL LOOSE OR DAMAGED MATERIAL. REFINISH TO LIKE NEW CONDITION, OR IF CONDITION WARRANTS REPLACE IN ENTIRETY.
N. THE OWNER SHALL RESERVE RIGHT TO CLAIM ANY MATERIALS THAT ARE BEING DEMOLISHED PRIOR TO THE CONTRACTOR DISPOSING OF THEM OFF SITE.
O. "TURNED OVER TO THE OWNER" DENOTES: 1) TAG AND IDENTIFY ITEMS: 2) STORE IN AN ORDERLY FASHION IN A LOCATION DESIGNATED BY THE OWNER.

DEMOLITION PLAN NOTES (X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
AD02	EXISTING DOOR AND HARDWARE TO BE REMOVED, EXISTING FRAME TO REMAIN
AD50	REMOVE EXISTING VINYL COATED TUFTED TILE (VCTT) FLOORING IN ITS ENTIRETY, ALONG WITH ALL NOSING TRIM ON EXISTING RISERS. REMOVE ADHESIVES DOWN TO EXISTING SLAB AND PREPARE SURFACE TO RECEIVE NEW FINISH AS SCHEDULED
1 AD55	REMOVE EXISTING MASONRY WALL CONSTRUCTION AND PLASTER FINISH, AS REQUIRED TO ACCOMMODATE NEW STRUCTURAL COLUMN. REMOVE CMU TO NEAREST JOINT. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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ARCHITECT

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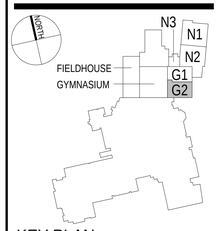

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE REGISTERED No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: KT

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G2 - UPPER LEVEL DEMOLITION PLAN

AD0.06

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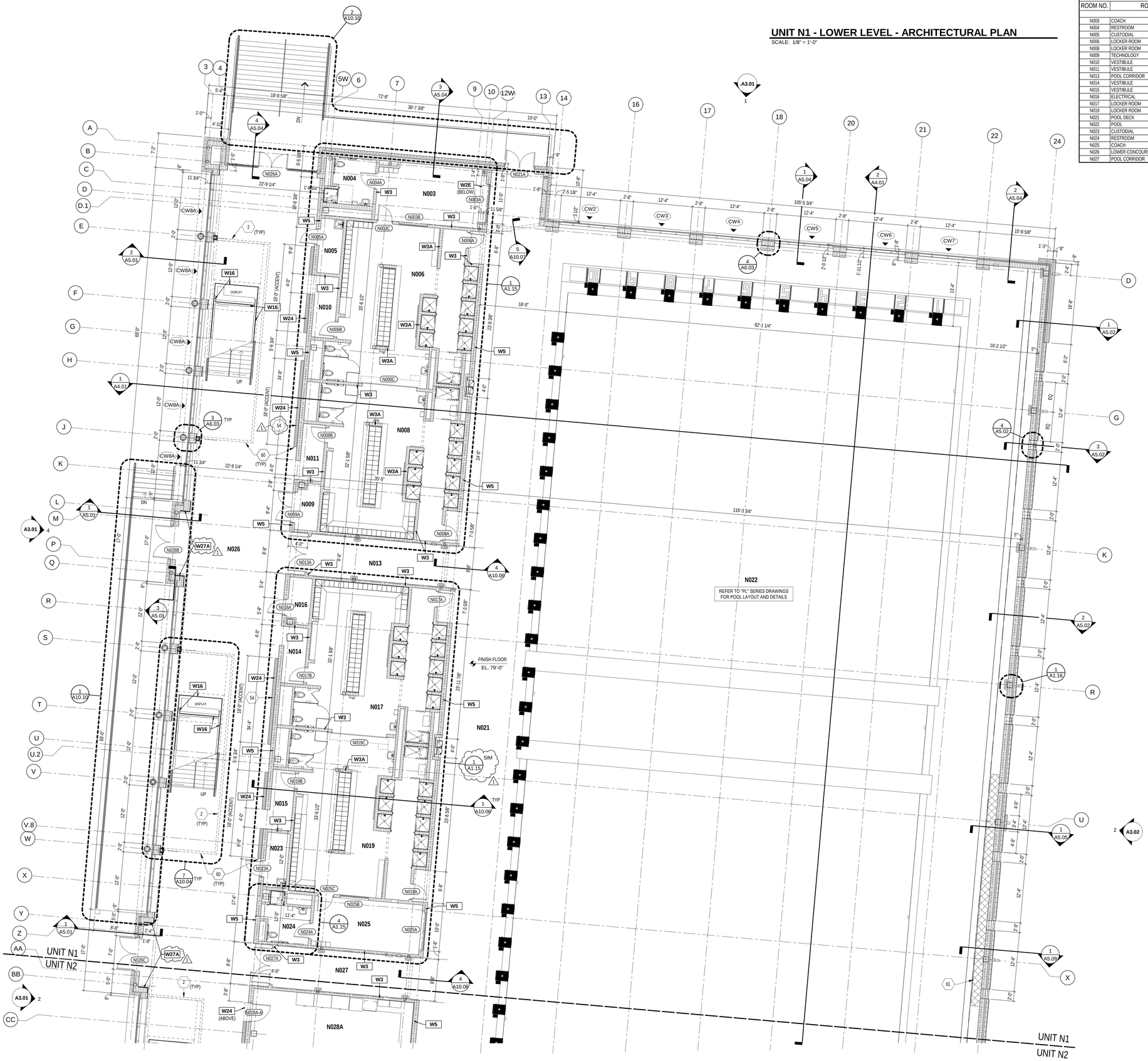
UNIT N1 - LOWER LEVEL - ARCHITECTURAL PLAN

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



ROOM LEGEND - LOWER LEVEL UNIT N1

ROOM NO.	ROOM NAME	AREA (SF)
N003	COACH	260 SF
N004	RESTROOM	87 SF
N005	CUSTODIAL	53 SF
N006	LOCKER ROOM	788 SF
N008	LOCKER ROOM	718 SF
N009	TECHNOLOGY	43 SF
N010	VESTIBULE	64 SF
N011	VESTIBULE	59 SF
N013	POOL CORRIDOR	263 SF
N014	VESTIBULE	59 SF
N015	VESTIBULE	63 SF
N016	ELECTRICAL	43 SF
N017	LOCKER ROOM	717 SF
N019	LOCKER ROOM	784 SF
N021	POOL DECK	13162 SF
N022	POOL	14163 SF
N023	CUSTODIAL	53 SF
N024	RESTROOM	80 SF
N025	COACH	234 SF
N026	LOWER CONCOURSE	8296 SF
N027	POOL CORRIDOR	263 SF

ARCHITECTURAL PLAN GENERAL NOTES

A. ALL CMU WALLS THAT DO NOT LAY OUT IN FULL OR HALF LENGTHS SHOULD BE BALANCED SO AS NOT TO HAVE ANY PIECES LESS THAN 4" IN SIZE EXPOSED TO VIEW.

B. WHERE DISSIMILAR FLOOR MATERIALS MEET, THEY SHALL DO SO UNDER THE CENTERLINE OF THE DOOR, UNLESS NOTED OTHERWISE.

C. THERE SHALL BE PERIMETER INSULATION CONTINUOUS AROUND THE ENTIRE PERIMETER OF THE BUILDING EXTENDING 2'-0" MINIMUM BELOW GRADE.

D. THE BASE FLOOR ELEVATION INDICATED FOR THE PROJECT IS 79'-0". REFER TO SITE PLAN FOR CORRELATION TO USGS DATUM.

E. ALL INTERIOR MASONRY WALLS THAT RUN TO UNDERSIDE OF DECK ABOVE SHALL HAVE A 2" JOINT (U.N.O.) AT THE DECK TO BE FILLED WITH FIRE STOPPING AT RATED WALLS PER PROJECT MANUAL., AND MINERAL WOOL AT THE NON-RATED WALLS, TO ALLOW FOR DEFLECTION.

F. FOR TYPICAL COMMON JOINT DETAILS AND CONSTRUCTION MOVEMENT JOINT DETAILS REFER TO DETAILS ON SHEET A1.17.

G. ALL DIMENSIONS ON FLOOR PLANS ARE TO FINISH FACE OF CMU, CONCRETE, BRICK OR FINISH FACE OF GWB AT METAL STUD WALLS, UNLESS NOTED OTHERWISE. EXCEPTION: EXTERIOR METAL STUD WALLS ARE TO FACE OF METAL STUDS.

H. HINGE SIDE DOOR JAMB AT WALLS WILL TYPICALLY BE LOCATED 4" MINIMUM FROM ADJACENT WALL UNLESS NOTED OTHERWISE.

I. ALL EXPOSED CONCRETE MASONRY UNITS (CMU) CORNERS ARE TO BE BULLNOSE, EXCEPT AT WINDOW JAMBS, BULKHEADS, WINDOW AND DOOR HEADS.

J. SEE REFLECTED CEILING PLANS FOR BULKHEAD LOCATIONS AND DETAIL REFERENCES.

K. REFER TO ROOM FINISH SCHEDULE OR PLAN AND EQUIPMENT PLANS FOR LOCATION AND EXTENT OF FINISH FLOOR MATERIALS.

L. PROVIDE WOOD BLOCKING AS REQUIRED. WITHIN METAL STUD WALLS FOR WALL MOUNTED ITEMS.

M. REFER TO MASTERCODE PLANS FOR CODE INFORMATION AND FIRE RATED WALL LOCATIONS.

N. PROVIDE SPRAY FOAM INSULATION AND THERMAL BARRIER CONTINUOUS AT INTERSECTION OF EXTERIOR WALLS AND DECK.

ARCHITECTURAL PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

—— W### INDICATES WALL TYPE. REFER TO DRAWING A1.00 FOR WALL THICKNESS, HEIGHT AND COMPOSITION.

NO.	DESCRIPTION
2	DASHED LINE INDICATES BULKHEAD ABOVE, REFER TO REFLECTED CEILING PLAN
54	REFER TO 9-A1.16 FOR ACCENT WALL DETAIL (W24). REFER TO A0 SERIES FOR ADDITIONAL INFORMATION.
60	FACE OF ACCENT WALL TO ALIGN WITH FACE OF GWB BULKHEAD AT ADJACENT STAIR, REFER TO REFLECTED CEILING PLAN
61	SCOREBOARD, REFER TO POOL SERIES DRAWINGS

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL CLAY SCHOOLS

ARCHITECT

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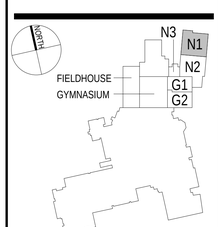

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAINE REGISTERED No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: KT

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N1 - LOWER LEVEL ARCHITECTURAL PLAN

A1.01

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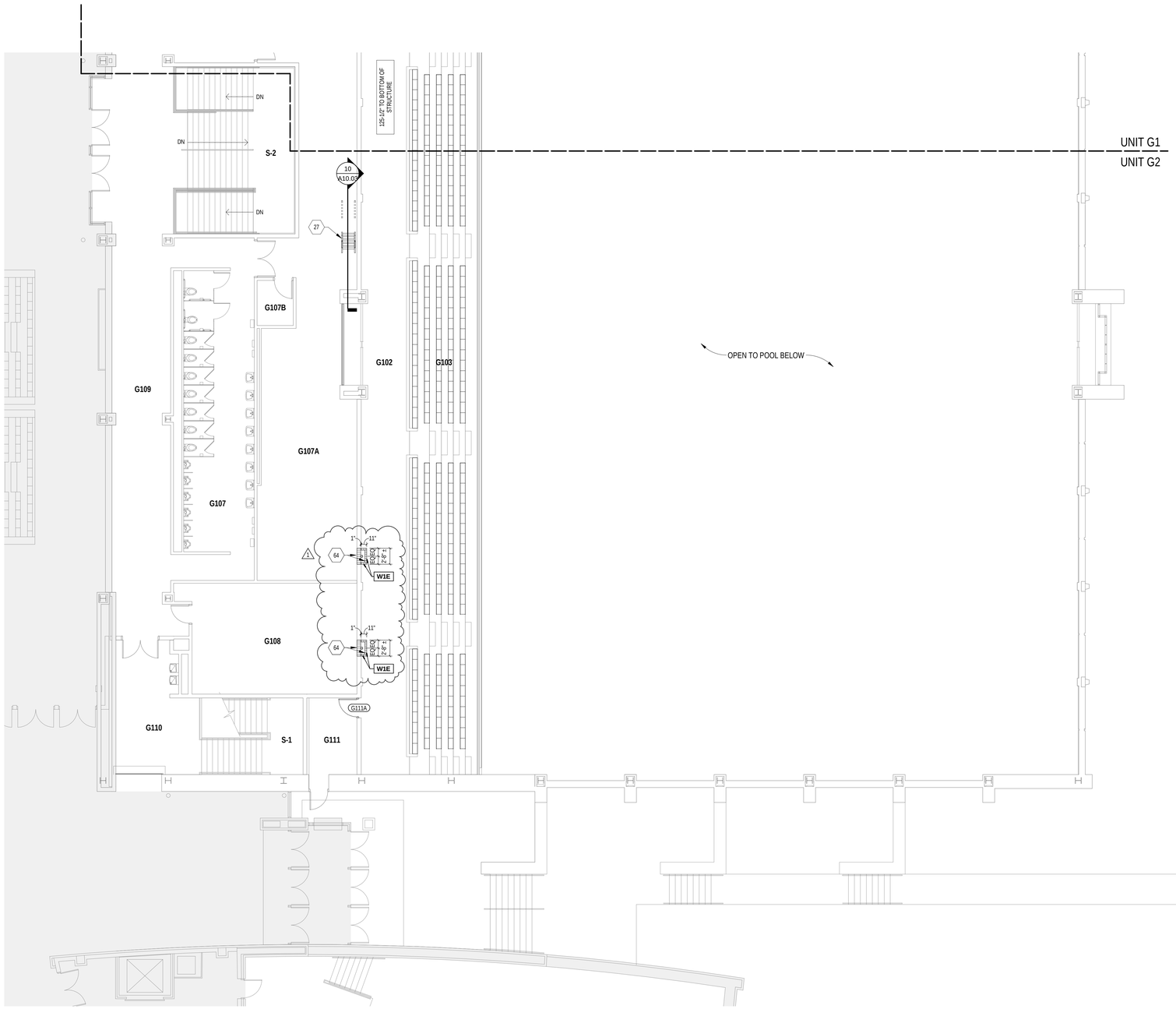

UNIT G2 - FIRST FLOOR - ARCHITECTURAL PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT G2

ROOM NO.	ROOM NAME	AREA (SF)
G102	SEATING CROSS AISLE	1669 SF
G103	POOL SEATING	2418 SF
G107	MEN'S RESTROOM	691 SF
G107A	MECHANICAL	980 SF
G107B	ELECTRICAL	46 SF
G108	TEAM ROOM	522 SF
G109	CORRIDOR	1668 SF
G110	PASSAGE	281 SF
G111	VESTIBULE	108 SF
S-1	STAIR	231 SF
S-2	STAIR	529 SF

ARCHITECTURAL PLAN GENERAL NOTES

A. ALL CMU WALLS THAT DO NOT LAY OUT IN FULL OR HALF LENGTHS SHOULD BE BALANCED SO AS NOT TO HAVE ANY PIECES LESS THAN 4" IN SIZE EXPOSED TO VIEW.
B. WHERE DISSIMILAR FLOOR MATERIALS MEET, THEY SHALL DO SO UNDER THE CENTERLINE OF THE DOOR, UNLESS NOTED OTHERWISE.
C. THERE SHALL BE PERIMETER INSULATION CONTINUOUS AROUND THE ENTIRE PERIMETER OF THE BUILDING EXTENDING 2'-0" MINIMUM BELOW GRADE.
D. THE BASE FLOOR ELEVATION INDICATED FOR THE PROJECT IS 79'-0". REFER TO SITE PLAN FOR CORRELATION TO USGS DATUM.
E. ALL INTERIOR MASONRY WALLS THAT RUN TO UNDERSIDE OF DECK ABOVE SHALL HAVE A 2" JOINT (U.N.O.) AT THE DECK TO BE FILLED WITH FIRE STOPPING AT RATED WALLS PER PROJECT MANUAL., AND MINERAL WOOL AT THE NON-RATED WALLS, TO ALLOW FOR DEFLECTION.
F. FOR TYPICAL COMMON JOINT DETAILS AND CONSTRUCTION MOVEMENT JOINT DETAILS REFER TO DETAILS ON SHEET A1.17.
G. ALL DIMENSIONS ON FLOOR PLANS ARE TO FINISH FACE OF CMU, CONCRETE, BRICK OR FINISH FACE OF GWB AT METAL STUD WALLS, UNLESS NOTED OTHERWISE. EXCEPTION: EXTERIOR METAL STUD WALLS ARE TO FACE OF METAL STUDS.
H. HINGE SIDE DOOR JAMB AT WALLS WILL TYPICALLY BE LOCATED 4" MINIMUM FROM ADJACENT WALL UNLESS NOTED OTHERWISE.
I. ALL EXPOSED CONCRETE MASONRY UNITS (CMU) CORNERS ARE TO BE BULLNOSE, EXCEPT AT WINDOW JAMBS, BULKHEADS, WINDOW AND DOOR HEADS.
J. SEE REFLECTED CEILING PLANS FOR BULKHEAD LOCATIONS AND DETAIL REFERENCES.
K. REFER TO ROOM FINISH SCHEDULE OR PLAN AND EQUIPMENT PLANS FOR LOCATION AND EXTENT OF FINISH FLOOR MATERIALS.
L. PROVIDE WOOD BLOCKING AS REQUIRED. WITHIN METAL STUD WALLS FOR WALL MOUNTED ITEMS.
M. REFER TO MASTERCODE PLANS FOR CODE INFORMATION AND FIRE RATED WALL LOCATIONS.
N. PROVIDE SPRAY FOAM INSULATION AND THERMAL BARRIER CONTINUOUS AT INTERSECTION OF EXTERIOR WALLS AND DECK.

ARCHITECTURAL PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

W### INDICATES WALL TYPE. REFER TO DRAWING A1.00 FOR WALL THICKNESS, HEIGHT AND COMPOSITION.

NO.	DESCRIPTION
27	PREFABRICATED ALUMINUM SHIPS LADDER AND ROOF ACCESS HATCH (ABOVE). REFER TO ROOF PLAN.
1 64	PROVIDE NEW MASONRY (ALIGN WITH AND MATCH EXISTING). NEW MASONRY TO MATCH BOND OF EXISTING WALL. CUT NEW CMU TO ACCOMMODATE STEEL COLUMN (WHERE APPLICABLE). EXTEND NEW MASONRY TO UNDERSIDE OF EXISTING STEEL BEAM

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

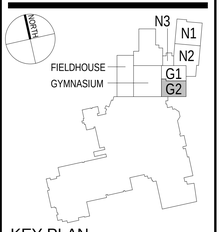
CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204



KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE
REGISTERED
No. 4169
STATE OF INDIANA
ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: KT
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G2 - UPPER LEVEL ARCHITECTURAL PLAN

A1.10

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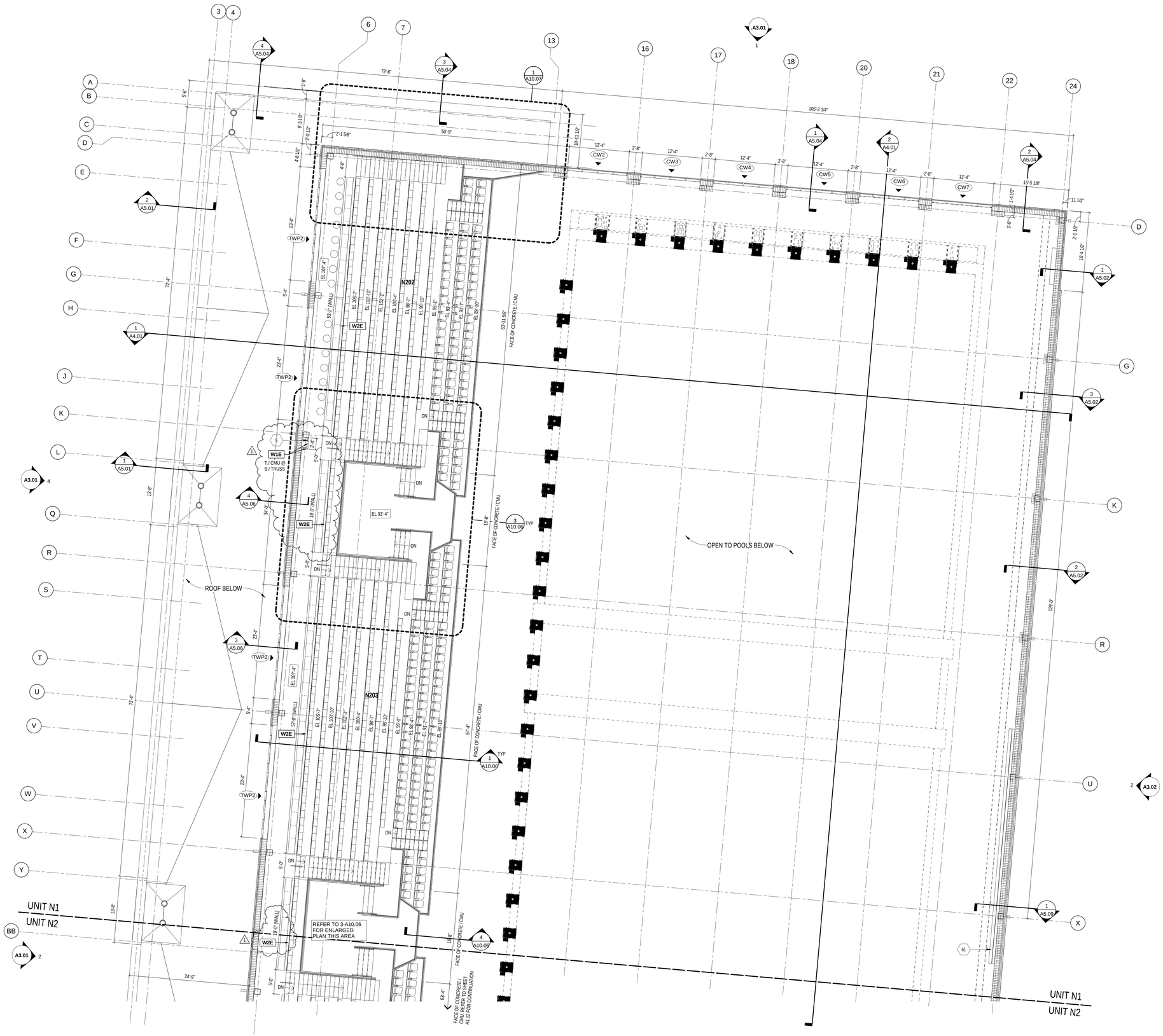
UNIT N1 - UPPER POOL SEATING LEVEL - ARCHITECTURAL PLAN

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



ROOM LEGEND - UPPER SEATING LEVEL UNIT N1

ROOM NO.	ROOM NAME	AREA (SF)
N201	CROSS AISLE	1369 SF
N202	POOL SEATING	1869 SF
N203	POOL SEATING	2086 SF

ARCHITECTURAL PLAN GENERAL NOTES

A. ALL CMU WALLS THAT DO NOT LAY OUT IN FULL OR HALF LENGTHS SHOULD BE BALANCED SO AS NOT TO HAVE ANY PIECES LESS THAN 4" IN SIZE EXPOSED TO VIEW.
B. WHERE DISSIMILAR FLOOR MATERIALS MEET, THEY SHALL DO SO UNDER THE CENTERLINE OF THE DOOR, UNLESS NOTED OTHERWISE.
C. THERE SHALL BE PERIMETER INSULATION CONTINUOUS AROUND THE ENTIRE PERIMETER OF THE BUILDING EXTENDING 2'-0" MINIMUM BELOW GRADE.
D. THE BASE FLOOR ELEVATION INDICATED FOR THE PROJECT IS 79'-0". REFER TO SITE PLAN FOR CORRELATION TO USGS DATUM.
E. ALL INTERIOR MASONRY WALLS THAT RUN TO UNDERSIDE OF DECK ABOVE SHALL HAVE A 2" JOINT (U.N.O.) AT THE DECK TO BE FILLED WITH FIRE STOPPING AT RATED WALLS PER PROJECT MANUAL, AND MINERAL WOOL AT THE NON-RATED WALLS, TO ALLOW FOR DEFLECTION.
F. FOR TYPICAL COMMON JOINT DETAILS AND CONSTRUCTION MOVEMENT JOINT DETAILS REFER TO DETAILS ON SHEET A1.17.
G. ALL DIMENSIONS ON FLOOR PLANS ARE TO FINISH FACE OF CMU, CONCRETE, BRICK OR FINISH FACE OF GWB AT METAL STUD WALLS, UNLESS NOTED OTHERWISE. EXCEPTION: EXTERIOR METAL STUD WALLS ARE TO FACE OF METAL STUDS.
H. HINGE SIDE DOOR JAMB AT WALLS WILL TYPICALLY BE LOCATED 4" MINIMUM FROM ADJACENT WALL UNLESS NOTED OTHERWISE.
I. ALL EXPOSED CONCRETE MASONRY UNITS (CMU) CORNERS ARE TO BE BULLNOSE, EXCEPT AT WINDOW JAMBS, BULKHEADS, WINDOW AND DOOR HEADS.
J. SEE REFLECTED CEILING PLANS FOR BULKHEAD LOCATIONS AND DETAIL REFERENCES.
K. REFER TO ROOM FINISH SCHEDULE OR PLAN AND EQUIPMENT PLANS FOR LOCATION AND EXTENT OF FINISH FLOOR MATERIALS.
L. PROVIDE WOOD BLOCKING AS REQUIRED, WITHIN METAL STUD WALLS FOR WALL MOUNTED ITEMS.
M. REFER TO MASTERCODE PLANS FOR CODE INFORMATION AND FIRE RATED WALL LOCATIONS.
N. PROVIDE SPRAY FOAM INSULATION AND THERMAL BARRIER CONTINUOUS AT INTERSECTION OF EXTERIOR WALLS AND DECK.

ARCHITECTURAL PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

W### INDICATES WALL TYPE. REFER TO DRAWING A1.00 FOR WALL THICKNESS, HEIGHT AND COMPOSITION.

NO.	DESCRIPTION
5	FINISH FACE OF WALL TO ALIGN WITH FACE OF STEEL COLUMN AT THIS LOCATION.
61	SCOREBOARD, REFER TO POOL SERIES DRAWINGS

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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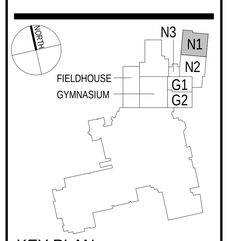

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE
No. 4169
STATE OF INDIANA
ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: KT

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N1 - UPPER POOL SEATING LEVEL ARCHITECTURAL PLAN

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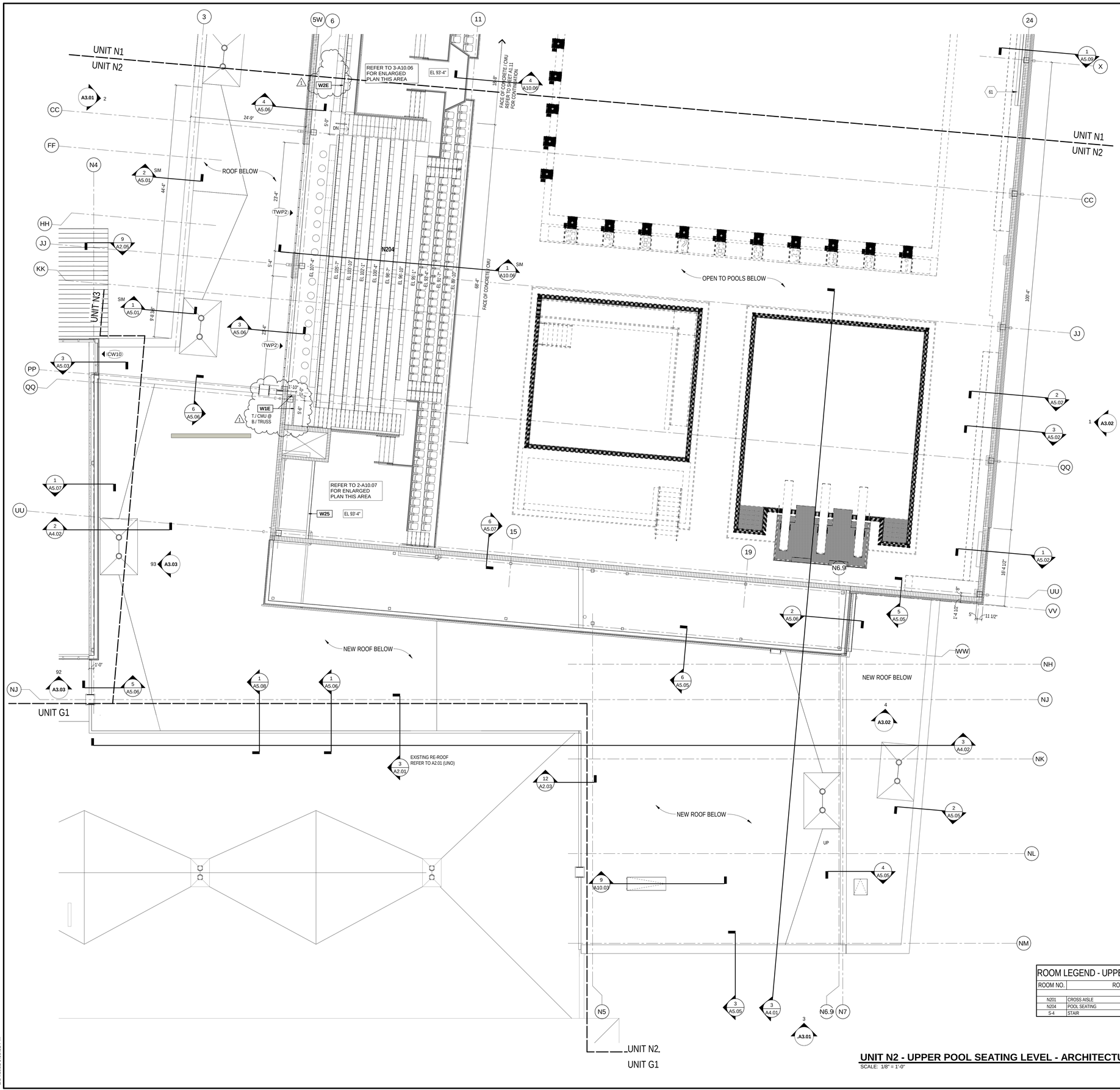

ROOM LEGEND - UPPER SEATING LEVEL UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N201	CROSS AISLE	1369 SF
N204	POOL SEATING	2206 SF
S-4	STAIR	166 SF

UNIT N2 - UPPER POOL SEATING LEVEL - ARCHITECTURAL PLAN

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

ARCHITECTURAL PLAN GENERAL NOTES

A. ALL CMU WALLS THAT DO NOT LAY OUT IN FULL OR HALF LENGTHS SHOULD BE BALANCED SO AS NOT TO HAVE ANY PIECES LESS THAN 4" IN SIZE EXPOSED TO VIEW.
B. WHERE DISSIMILAR FLOOR MATERIALS MEET, THEY SHALL DO SO UNDER THE CENTERLINE OF THE DOOR, UNLESS NOTED OTHERWISE.
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ARCHITECTURAL PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

—— W### INDICATES WALL TYPE. REFER TO DRAWING A1.00 FOR WALL THICKNESS, HEIGHT AND COMPOSITION.

NO.	DESCRIPTION
61	SCOREBOARD, REFER TO POOL SERIES DRAWINGS

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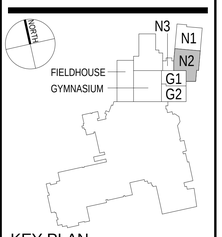

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE REGISTERED ARCHITECT No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: KT

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N2 - UPPER POOL SEATING LEVEL ARCHITECTURAL PLAN

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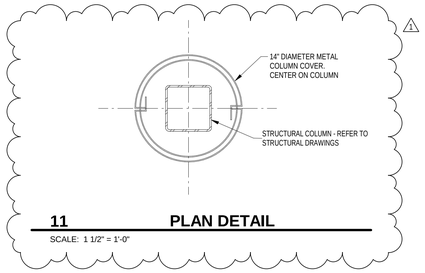
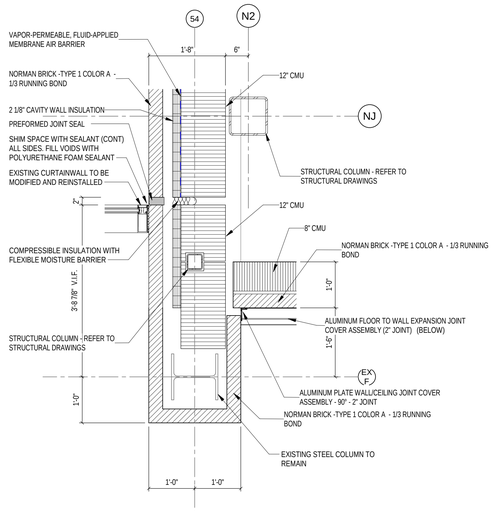


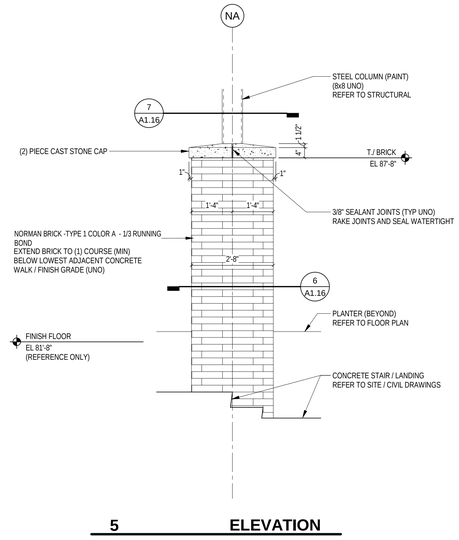
11 PLAN DETAIL

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



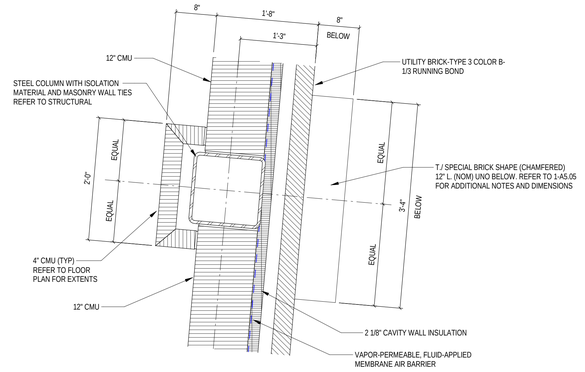
8 PLAN DETAIL

SCALE: 3/4" = 1'-0"



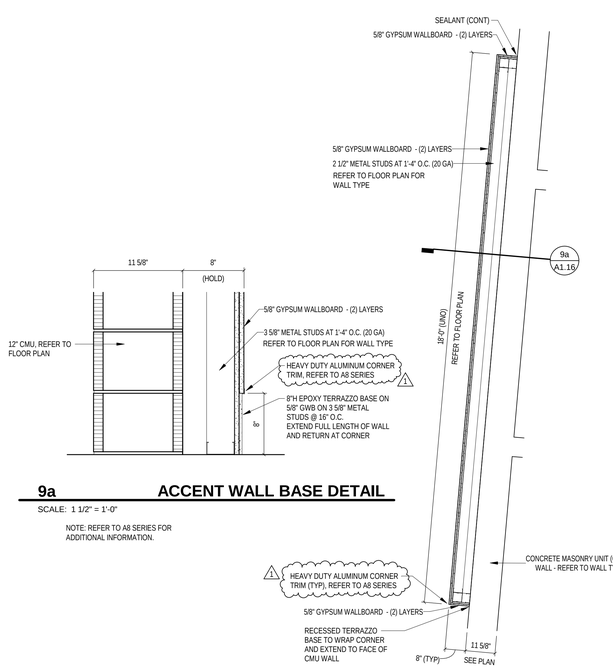
5 ELEVATION

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



1 DETAIL

SCALE: 1" = 1'-0"



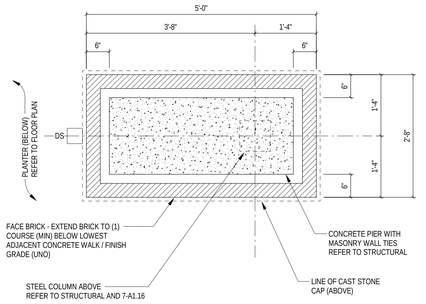
9a ACCENT WALL BASE DETAIL

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

NOTE: REFER TO A8 SERIES FOR ADDITIONAL INFORMATION.

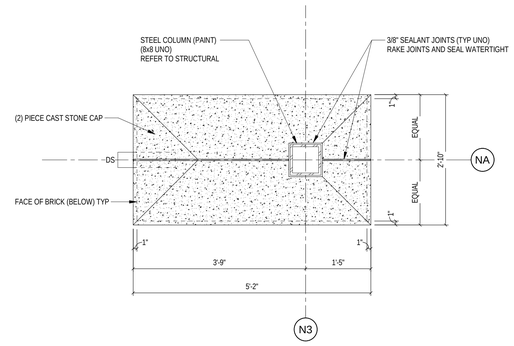
9 ENLARGED PLAN - ACCENT WALL

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



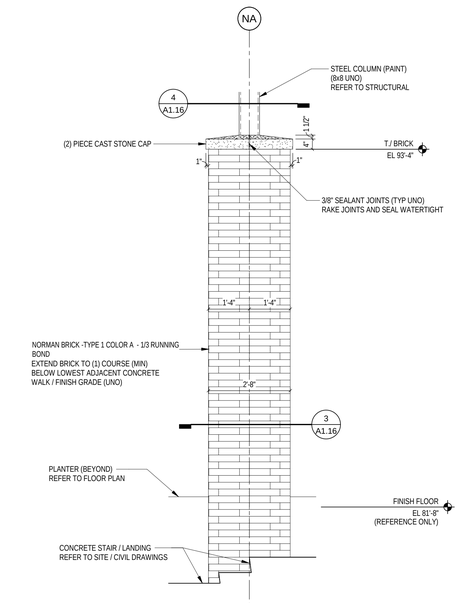
6 DETAIL

SCALE: 3/4" = 1'-0"



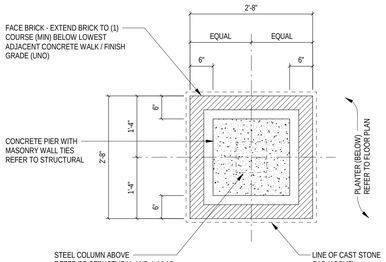
7 DETAIL

SCALE: 3/4" = 1'-0"



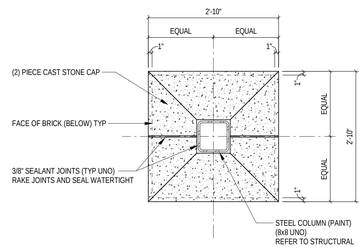
2 ELEVATION

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



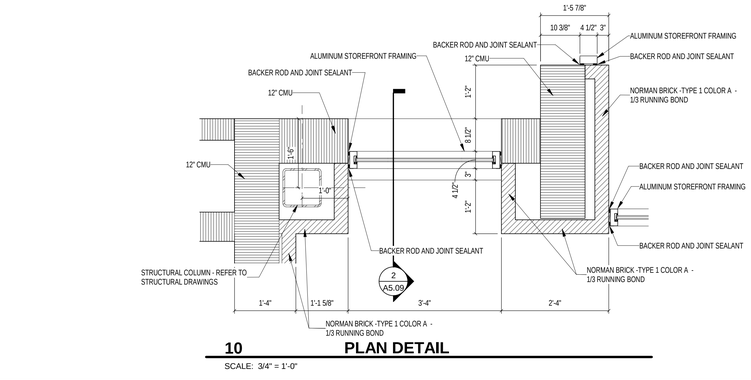
3 DETAIL

SCALE: 3/4" = 1'-0"



4 DETAIL

SCALE: 3/4" = 1'-0"



10 PLAN DETAIL

SCALE: 3/4" = 1'-0"

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ARCHITECT

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE STATE OF INDIANA No. 4169 REGISTERED ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: MDM

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

DETAILS

A1.16

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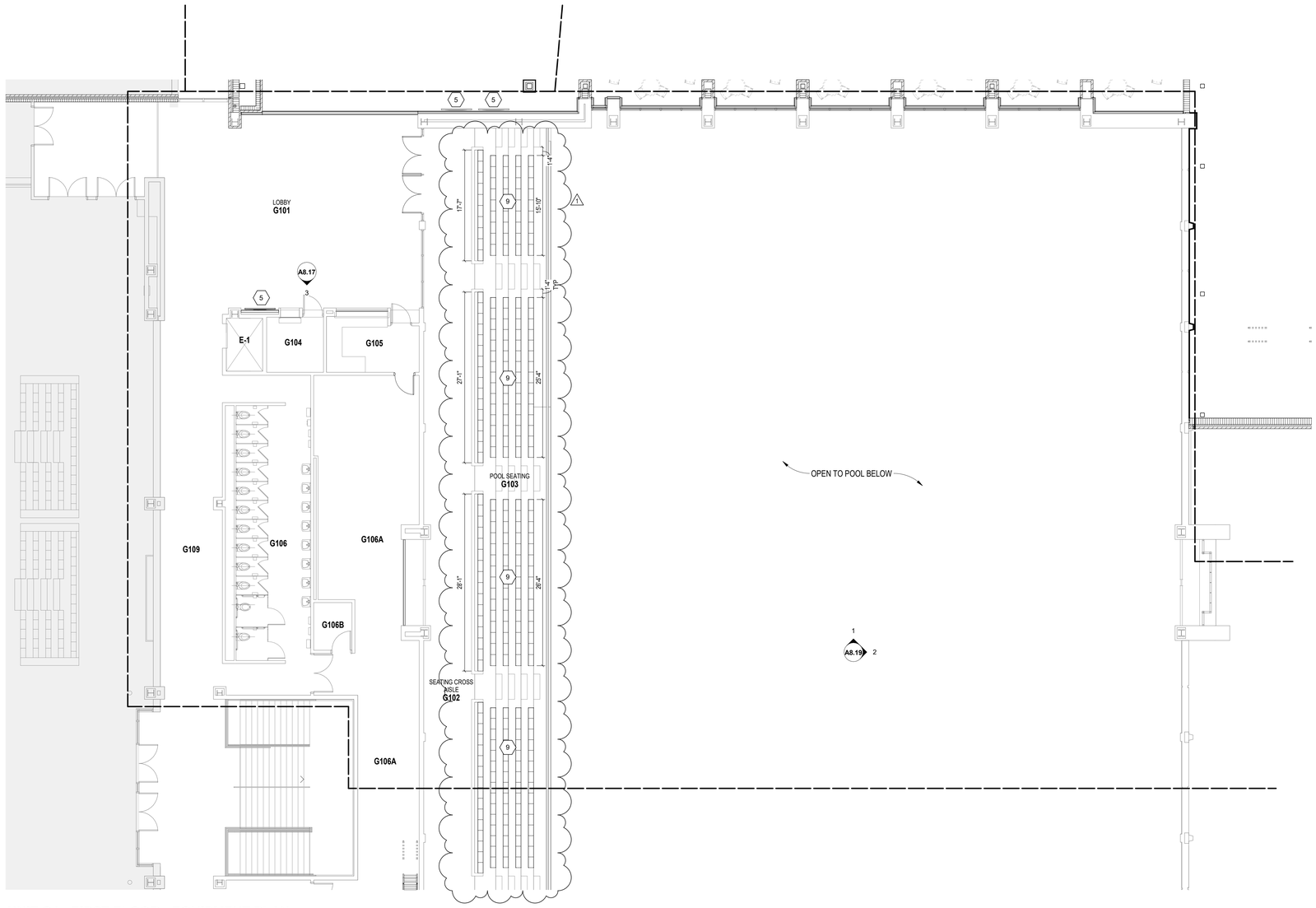

UNIT G1 - FIRST FLOOR - EQUIPMENT PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT G1

ROOM NO.	ROOM NAME	AREA (SF)
E-1	ELEVATOR	50 SF
G101	LOBBY	1590 SF
G102	SEATING CROSS AISLE	1669 SF
G103	POOL SEATING	2418 SF
G104	TICKETS	79 SF
G105	CONCESSIONS	130 SF
G106	WOMEN'S RESTROOM	612 SF
G106A	MECHANICAL	871 SF
G106B	TECHNOLOGY	46 SF
G109	CORRIDOR	1668 SF

EQUIPMENT GENERAL NOTES

A. ALL COUNTERTOPS TO HAVE CONTINUOUS 4" HIGH BACKSPLASHES AND ENDSPLASHES UNLESS NOTED OTHERWISE.
B. HIDDEN LINES (- - -) INDICATE ITEMS TO BE PART OF LOOSE EQUIPMENT PACKAGE OR BY OWNER, NOT INCLUDED IN CONSTRUCTION CONTRACTS. DASHED LINES (- · - · -) INDICATE OVERHEAD ITEMS (INCLUDED IN CONSTRUCTION CONTRACTS).
C. REFER TO A7S.01 EQUIPMENT LIST OF FINISHES FOR COLOR SELECTIONS.
D. (TB) INDICATES 4' HIGH TACK BOARD, LENGTH AS INDICATED. REFER TO MOUNTING HEIGHT DRAWING.
E. (MB) INDICATES 4' HIGH MARKER BOARD, LENGTH AS INDICATED. REFER TO MOUNTING HEIGHT DRAWING.
F. PROVIDE FILLER STRIPS BETWEEN CASEWORK UNITS AND WALL OR BETWEEN ANY UNIT AS REQUIRED. EXTEND COUNTER TO FACE OF WALL OR ADJACENT TALL CABINET.
G. ALL CASEWORK DOORS AND DRAWERS SHALL BE LOCKABLE.
H. ALL EXPOSED ENDS AND BACKS OF CASEWORK SHALL BE FINISHED.
I. CASEWORK INSTALLER SHALL CUT CASEWORK AS REQUIRED FOR PLUMBING/ELECTRICAL LINES.
J. CASEWORK INSTALLER SHALL CAULK BETWEEN COUNTERS, BACKSPLASHES, AND WALLS.
K. ALL WALL-MOUNTED CASEWORK SHALL BE MOUNTED WITH THE TOP AT 7'-0" AFF UNLESS OTHERWISE NOTED.
L. (RWS) INDICATES ROLLER WINDOW SHADE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
M. (FEC) INDICATES FIRE EXTINGUISHER CABINET. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
N. (FE) INDICATES FIRE EXTINGUISHER. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
O. (AED) INDICATES AUTOMATED EXTERNAL DEFIBRILLATOR. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

EQUIPMENT NOTES

(X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

1 VENDING MACHINE(S), PROVIDED BY CLIENT
2 ALL LOCKERS IN ROOM TO BE TYPE "A" WITH SSM-5 SEAT, UNLESS NOTED OTHERWISE. REFER TO DETAIL ON A7.13
3 TYPE "B" LOCKERS WITH PLASTIC BASE. REFER TO DETAIL ON A7.13
4 DISPLAY CASE. REFER TO A1 SERIES FOR SHELL CONSTRUCTION. REFER TO ENLARGED PLAN FOR ADDITIONAL INFORMATION.
5 MONITOR, BY OWNER
6 SPTC-1 PARTITIONS
7 BUILT-IN BENCH, REFER TO A8 SERIES
8 PTC-1 PARTITIONS
9 10" CONTOURED ALUMINUM BENCH SEATS, ANCHORED TO CONCRETE RISERS
10 FIXED SEATING, BASIS OF DESIGN IS HUSSEY FUSION STADIUM CHAIR WITH CAST ALUMINUM STANCHIONS AND STAINLESS STEEL HARDWARE
11 16"D SOLID SURFACE (SSM-1) COUNTERTOP WITH SUPPORTS NOT TO EXCEED 36" O.C. REFER TO DETAIL 9/A7.15.
12 BUILT-IN DESK, REFER TO ELEVATIONS
13 REFER TO PL SERIES DRAWINGS FOR POOL EQUIPMENT
14 PL-2 CABINETS WITH SSM-3 COUNTERTOP AND BACKSPLASH
15 15"D SOLID SURFACE (SSM-1) COUNTERTOP WITH 3" RADIUSED OUTSIDE CORNER, 4" BACKSPLASH, AND SUPPORT BRACKETS
16 SSM-1 SILL/PARTIAL HEIGHT WALL CAP
17 SOLID SURFACE (SSM-1) COUNTERTOP WITH 4" BACKSPLASH, AND SUPPORT BRACKETS
18 FREESTANDING STAINLESS STEEL SINK, REFER TO PLUMBING DRAWINGS
19 12"DIA CUTOUT IN COUNTERTOP FOR TRASH
20 PL-1 CABINETS WITH SSM-1 COUNTERTOP AND BACKSPLASH
21 SLAT WALL, FROM 38"AFF TO CEILING, REFER TO ELEVATION AND SPECIFICATIONS
22 RECORDS BOARD, BY SEPARATE CONTRACT
23 PL-3 CASEWORK, REFER TO ELEVATION
24 NEW SSM-5 BENCH SEAT ON EXISTING STEEL ANGLE SUPPORTS, PROVIDE STEEL SUBSTRUCTURE TO SPAN EXISTING SUPPORTS. REFER TO DETAIL 9/A7.13
25 16"D SOLID SURFACE (SSM-1) COUNTERTOP WITH SUPPORTS NOT TO EXCEED 36" O.C. REFER TO DETAIL 10/A7.15.
26 SOLID SURFACE (SSM-1) COUNTERTOP WITH 2" BACKSPLASH, AND SUPPORT BRACKETS NOT TO EXCEED 36" O.C. REFER TO DETAIL 11/A7.15.
27 SOLID SURFACE (SSM-1) COUNTERTOP WITH 4"BACKSPLASH, AND SUPPORT BRACKETS NOT TO EXCEED 36" O.C. REFER TO DETAIL 12/A7.15.
28 FLOOR MOUNTED FIXED PEDESTAL STOOL, CONWAY BACKLESS DINING STOOL 18318 WITH UNPERFORATED SEAT

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

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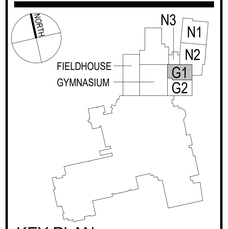
317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204



KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE REGISTERED No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G1 - UPPER LEVEL EQUIPMENT PLAN

A7.09

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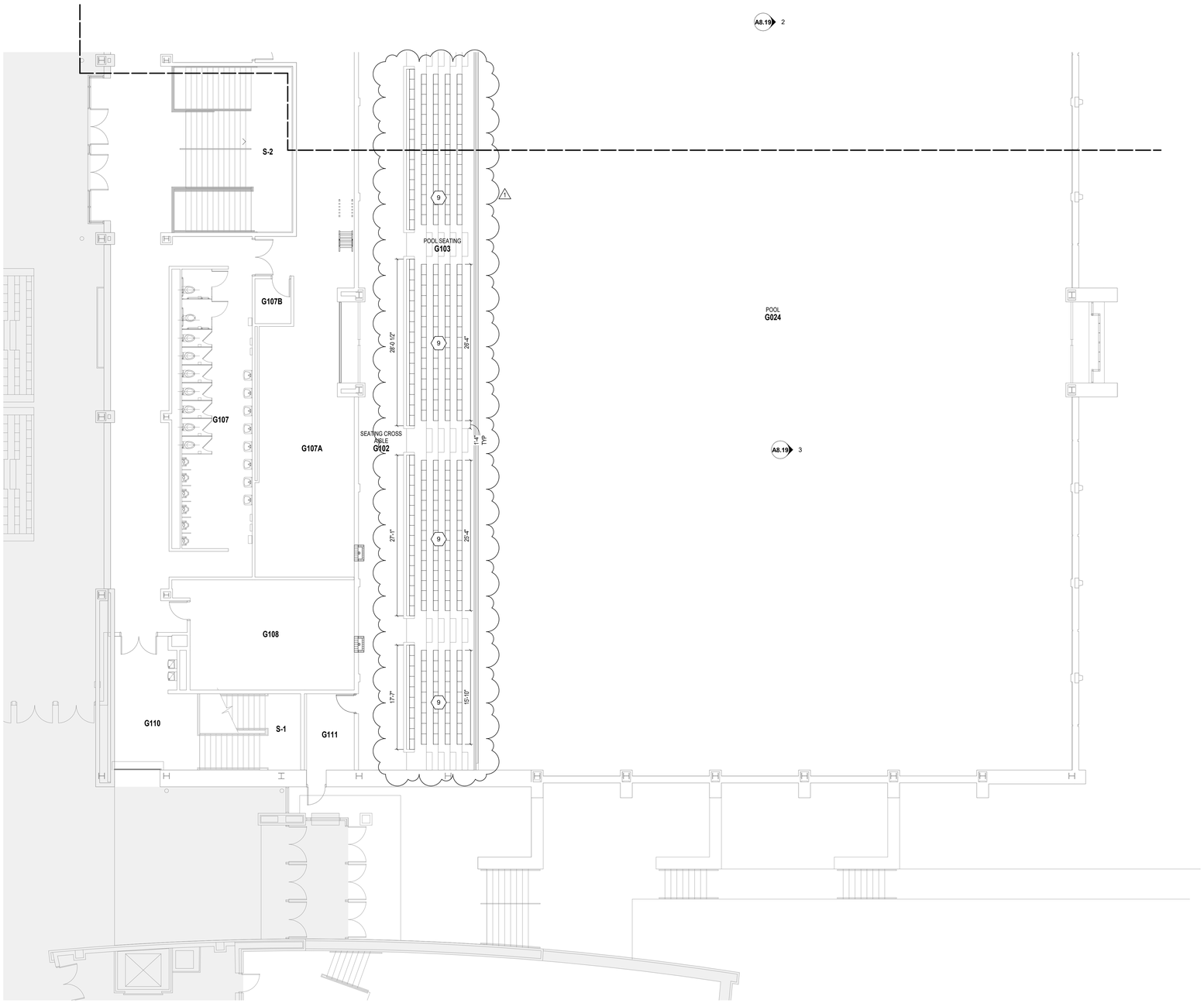

UNIT G2 - FIRST FLOOR - EQUIPMENT PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT G2

ROOM NO.	ROOM NAME	AREA (SF)
G102	SEATING CROSS AISLE	1669 SF
G103	POOL SEATING	2418 SF
G107	MEN'S RESTROOM	691 SF
G107A	MECHANICAL	980 SF
G107B	ELECTRICAL	46 SF
G108	TEAM ROOM	522 SF
G109	CORRIDOR	1668 SF
G110	PASSAGE	281 SF
G111	VESTIBULE	108 SF
S-1	STAIR	231 SF
S-2	STAIR	529 SF

EQUIPMENT GENERAL NOTES

A. ALL COUNTERTOPS TO HAVE CONTINUOUS 4" HIGH BACKSPLASHES AND ENDSPLASHES UNLESS NOTED OTHERWISE.
B. HIDDEN LINES (- - - -) INDICATE ITEMS TO BE PART OF LOOSE EQUIPMENT PACKAGE OR BY OWNER, NOT INCLUDED IN CONSTRUCTION CONTRACTS. DASHED LINES (- - - -) INDICATE OVERHEAD ITEMS (INCLUDED IN CONSTRUCTION CONTRACTS).
C. REFER TO A7S.01 EQUIPMENT LIST OF FINISHES FOR COLOR SELECTIONS.
D. (TB) INDICATES 4' HIGH TACK BOARD, LENGTH AS INDICATED. REFER TO MOUNTING HEIGHT DRAWING.
E. (MB) INDICATES 4' HIGH MARKER BOARD, LENGTH AS INDICATED. REFER TO MOUNTING HEIGHT DRAWING.
F. PROVIDE FILLER STRIPS BETWEEN CASEWORK UNITS AND WALL OR BETWEEN ANY UNIT AS REQUIRED. EXTEND COUNTER TO FACE OF WALL OR ADJACENT TALL CABINET.
G. ALL CASEWORK DOORS AND DRAWERS SHALL BE LOCKABLE.
H. ALL EXPOSED ENDS AND BACKS OF CASEWORK SHALL BE FINISHED.
I. CASEWORK INSTALLER SHALL CUT CASEWORK AS REQUIRED FOR PLUMBING/ELECTRICAL LINES.
J. CASEWORK INSTALLER SHALL CAULK BETWEEN COUNTERS, BACKSPLASHES, AND WALLS.
K. ALL WALL-MOUNTED CASEWORK SHALL BE MOUNTED WITH THE TOP AT 7'-0" AFF UNLESS OTHERWISE NOTED.
L. (RWS) INDICATES ROLLER WINDOW SHADE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
M. (FEC) INDICATES FIRE EXTINGUISHER CABINET. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
N. (FE) INDICATES FIRE EXTINGUISHER. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
O. (AED) INDICATES AUTOMATED EXTERNAL DEFIBRILLATOR, REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

EQUIPMENT NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

1 VENDING MACHINE(S), PROVIDED BY CLIENT
2 ALL LOCKERS IN ROOM TO BE TYPE "A" WITH SSM-5 SEAT, UNLESS NOTED OTHERWISE. REFER TO DETAIL ON A7.13
3 TYPE "B" LOCKERS WITH PLASTIC BASE. REFER TO DETAIL ON A7.13
4 DISPLAY CASE, REFER TO A1 SERIES FOR SHELL CONSTRUCTION. REFER TO ENLARGED PLAN FOR ADDITIONAL INFORMATION.
5 MONITOR, BY OWNER
6 SPTC-1 PARTITIONS
7 BUILT-IN BENCH, REFER TO A8 SERIES
8 PTC-1 PARTITIONS
9 10" CONTOURED ALUMINUM BENCH SEATS, ANCHORED TO CONCRETE RISERS
10 FIXED SEATING, BASIS OF DESIGN IS HUSSEY FUSION STADIUM CHAIR WITH CAST ALUMINUM STANCHIONS AND STAINLESS STEEL HARDWARE
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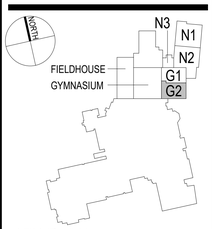

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE REGISTERED No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G2 - UPPER LEVEL EQUIPMENT PLAN

A7.10

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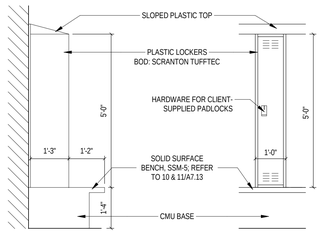
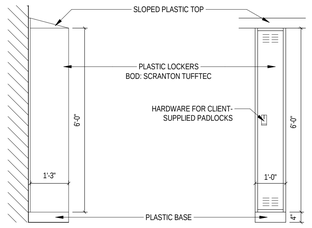


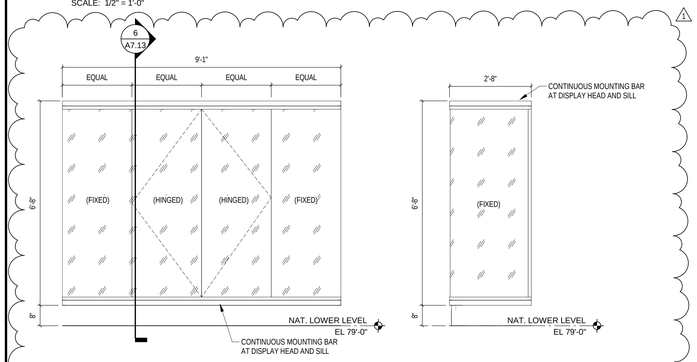
TYPE A



TYPE B

12 LOCKER DETAILS

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

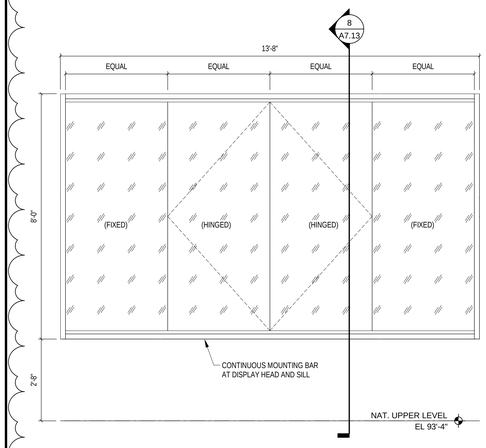


14 DISPLAY - ELEVATION

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

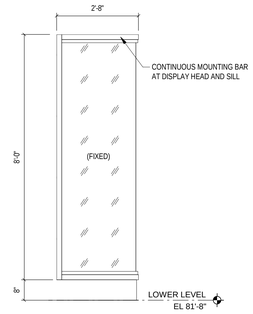
15 DISPLAY - ELEVATION

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



16 DISPLAY CASE - ELEVATION

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



17 DISPLAY CASE - ELEVATION

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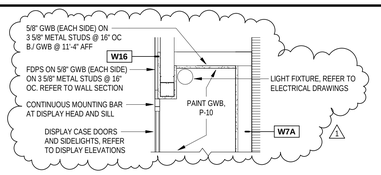
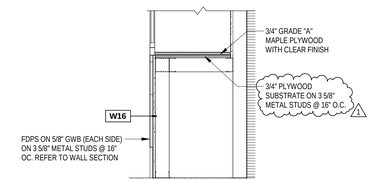
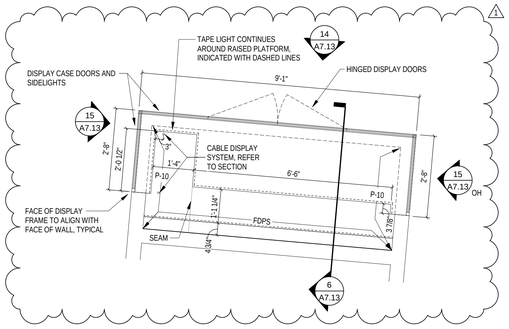




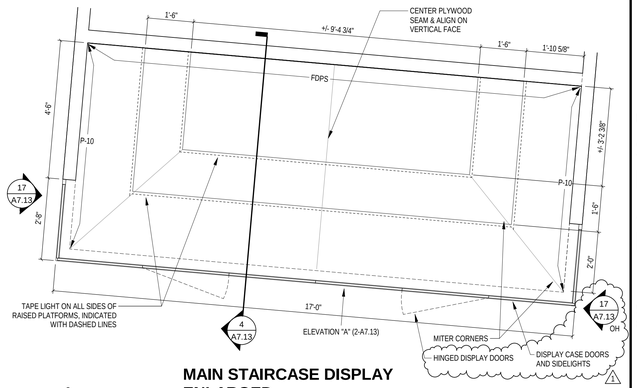
8 UPPER LEVEL DISPLAY CASE DETAIL

SCALE: 3/4" = 1'-0"



5 STAIRCASE DISPLAY ENLARGED

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



1 MAIN STAIRCASE DISPLAY ENLARGED

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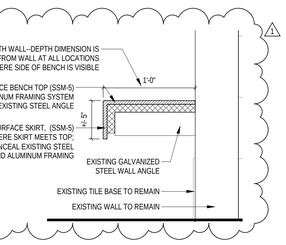

9 EXISTING NATATORIUM - NEW BENCH DETAIL

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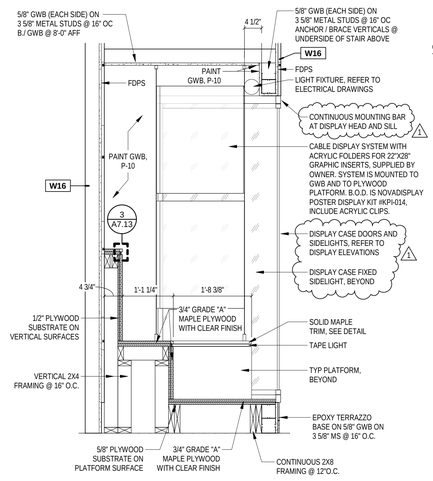
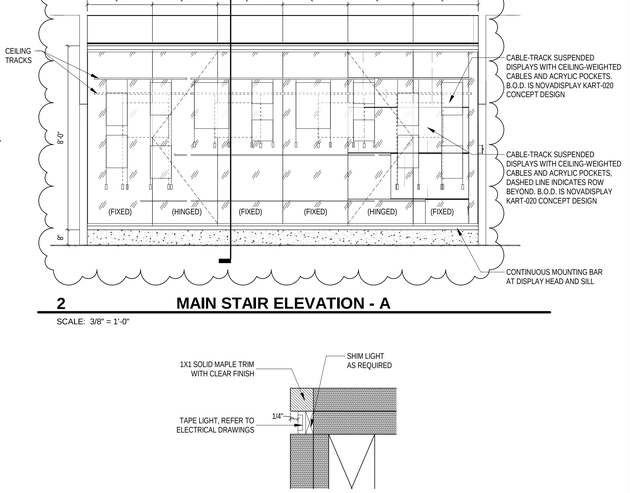


6 DISPLAY CASE DETAIL

SCALE: 3/4" = 1'-0"

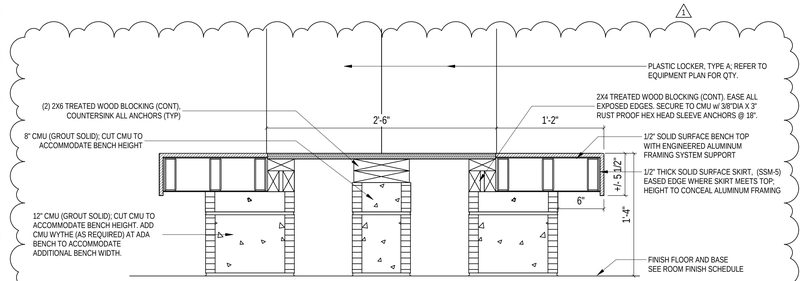


2 MAIN STAIR ELEVATION - A

SCALE: 3/8" = 1'-0"

3 TAPE LIGHT DETAIL

SCALE: 6" = 1'-0"



11 LOCKER BENCH DETAIL - ISLAND

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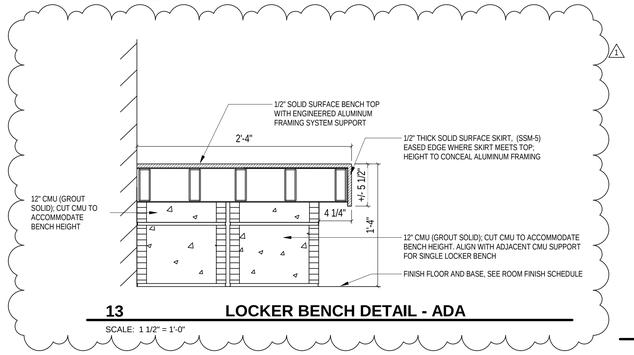
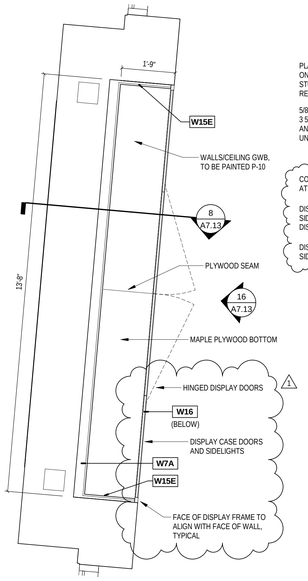


10 LOCKER BENCH DETAIL - SINGLE

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

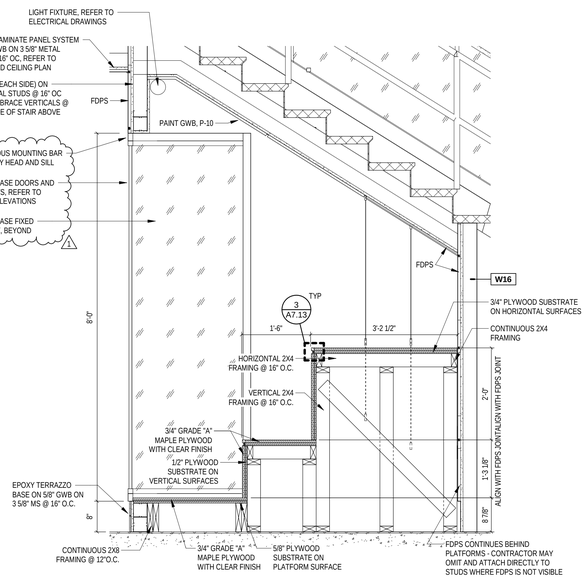
13 LOCKER BENCH DETAIL - ADA

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



7 DISPLAY CASE - UPPER LEVEL

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



4 MAIN DISPLAY CASE DETAIL

SCALE: 3/4" = 1'-0"

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317.848.0966 WWW.FHAI.COM
350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

WILLIAM E. DUNE — 10/07/1994 — No. 4169 — STATE OF INDIANA — ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

EQUIPMENT DETAILS

A7.13

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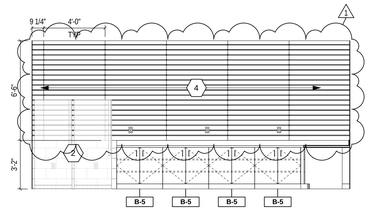
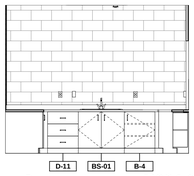


8 N034 CONCESSION - NORTH

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



9 N034 CONCESSION - EAST

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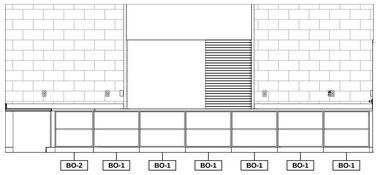

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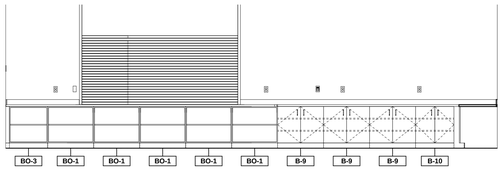

11 N112 CONCESSION - EAST

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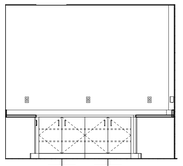

12 N112 CONCESSION - SOUTH

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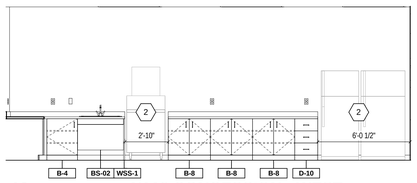

13 N112 CONCESSION - WEST

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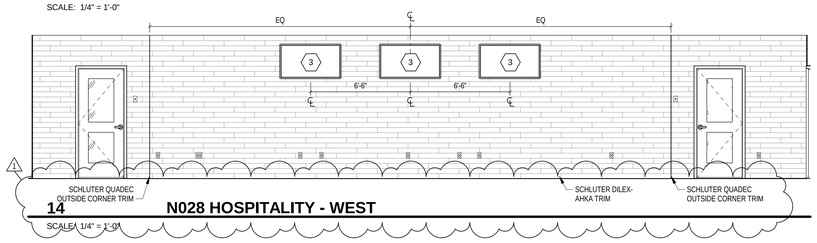

14 N028 HOSPITALITY - WEST

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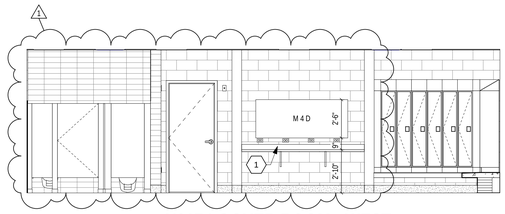

1 N017 LOCKER ROOM - WEST

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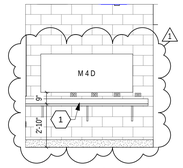

2 N006 COUNTERTOP

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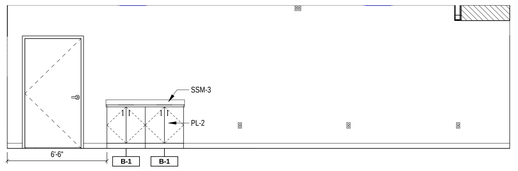
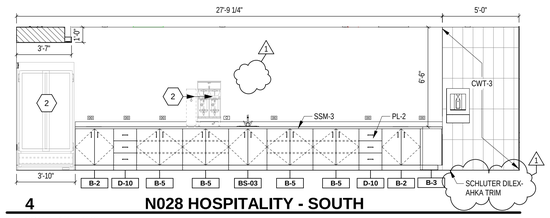


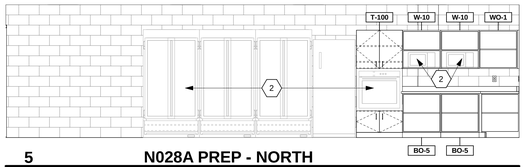
3 N028 HOSPITALITY - NORTH

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



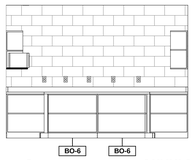
4 N028 HOSPITALITY - SOUTH

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



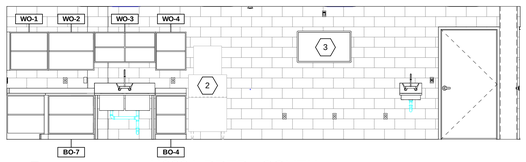
5 N028A PREP - NORTH

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



6 N028A PREP - EAST

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



7 N028A PREP - SOUTH

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

CASEWORK ELEVATION NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

1. SSM-1 COUNTERTOP/SPLASH WITH RAKKS SURFACE MOUNT EH COUNTER SUPPORT BRACKET EH-1212 IN CLEAR ANODIZED FINISH.
2. APPLIANCE BY OWNER. REFER TO A7 PLAN FOR ADDITIONAL DETAILS
3. MONITOR BY OWNER
4. PLASTIC LAMINATE SLAT WALL PANELS. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. CUT OUT FOR OUTLETS AS REQUIRED

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

WILLIAM E. PAVE REGISTERED No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: AML

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

CASEWORK & EQUIPMENT ELEVATIONS

A7.14

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UNIT N1 - LOWER LEVEL - FINISH PLAN

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

ROOM LEGEND - LOWER LEVEL UNIT N1

ROOM NO.	ROOM NAME	AREA (SF)
N003	COACH	260 SF
N004	RESTROOM	87 SF
N005	CUSTODIAL	53 SF
N006	LOCKER ROOM	788 SF
N008	LOCKER ROOM	718 SF
N009	TECHNOLOGY	43 SF
N010	VESTIBULE	64 SF
N011	VESTIBULE	59 SF
N013	POOL CORRIDOR	263 SF
N014	VESTIBULE	59 SF
N015	VESTIBULE	63 SF
N016	ELECTRICAL	43 SF
N017	LOCKER ROOM	717 SF
N019	LOCKER ROOM	784 SF
N021	POOL DECK	13162 SF
N022	POOL	14163 SF
N023	CUSTODIAL	53 SF
N024	RESTROOM	80 SF
N025	COACH	234 SF
N026	LOWER CONCOURSE	8296 SF
N027	POOL CORRIDOR	263 SF

GENERAL FINISH NOTES

A. SEALANT SHALL BE APPLIED AT ALL MATERIAL TRANSITIONS, BACKSPLASHES, AND DOOR FRAMES. ALL LOCATIONS WHERE NEW FINISH ABUTS A DISSIMILAR MATERIAL.
B. REMOVE AND REINSTALL EXISTING DEVICE FACEPLATES, SWITCH FACEPLATES, TECHNOLOGY FACEPLATES, AND CLOCKS.
C. EXISTING ITEMS TO REMAIN AND NEW FINISHES APPLIED AROUND INCLUDE BUT NOT LIMITED TO THERMOSTATS, AND FIRE EXTINGUISHER CABINETS (UNO).
D. INSTALL RESILIENT TRANSITION STRIP BETWEEN NEW FLOOR FINISH AND EXISTING FLOOR FINISH.
E. PROVIDE NEW RESILIENT TRANSITION STRIPS AT EXPOSED EDGE OF NEW FLOOR FINISH TO EXISTING FLOOR FINISH.
F. PAINT ALL SIDES (VERT. AND HORZ.) OF BULKHEAD/SOFFIT COLOR INDICATED (UNO).
G. EXISTING INTERIOR DOOR FRAMES ARE TO REMAIN. DO NOT PAINT.
H. PAINT ALL NEW INTERIOR DOOR FRAMES TO MATCH EXISTING DOOR FRAME COLOR. PAINT ON ALL FACES (PAINT CODE #5.12).
I. PATCH AND REPAIR ALL HOLES AND IMPERFECTIONS, TO RECEIVE NEW FINISHES.
J. PROVIDE ANODIZED ALUMINUM SPECIAL PROFILE TRANSITION SYSTEM BETWEEN CERAMIC MOSAIC FLOOR TILE AND CARPET.
K. NOT USED.
L. AT BUILDING EXPANSION JOINTS, PROVIDE ALUMINUM JOINT PLATE COVER; SEE A1 SERIES FOR LOCATIONS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
M. NOT USED.
N. NOT USED.
O. REFER TO A9S.01 FOR LIST OF FINISHES AND ADDITIONAL GENERAL NOTES.
P. REFER TO A9S.01 FOR ELEVATOR FINISHES.
Q. REFER TO A1 ARCHITECTURAL SERIES FOR ALL WALL MATERIAL TYPES.
R. COORDINATE CONTROL JOINTS IN CONCRETE FLOOR SLAB WITH STRUCTURAL DRAWINGS.
S. REFER TO A8.21 FOR DEPTH MARKING, NO DIVING, AND BENCH SIGNAGE TILE DETAILS. REFER TO PL SERIES FOR LOCATIONS.
T. NOT USED.
U. ALL WALLS SCHEDULED TO RECEIVE FDPS SYSTEM MUST BE PRIMED PRIOR TO SYSTEM INSTALLATION.

FLOOR PATTERN/FINISH KEY NOTES

1 EXISTING EPOXY TERRAZZO FLOORING TO REMAIN, PROTECT DURING CONSTRUCTION
2 LINE REPRESENTS TERRAZZO DIVIDER STRIP. TYP. ARCHITECT TO PROVIDE CAD FILE FOR CURVE LAYOUT. REFER TO ENLARGED PLANS FOR ADDITIONAL INFORMATION
3 INSTALL SLIP-RESISTANT NOSINGS ALONG EGRESS STEPS AND SEATING TREADS. REFER TO DETAIL 7/A8.22 FOR ADDITIONAL INFORMATION
4 TRANSITION FROM CMT9 TO DRF BASE. SEE DETAIL ON A8.22
5 INSTALL DFO-1 FILM ON DOOR LITE. REFER TO DOOR SCHEDULE FOR SIZE
6 CMT-2 ON BENCH RISER AND TREAD. INCLUDE NOSING TRIM. REFER TO DETAIL 2/A8.22
7 CMT-2 SILL WITH BULLNOSE EDGE. REFER TO DETAIL 2/A8.22
8 NEW EPOXY TERRAZZO DIVIDER STRIPS TO ALIGN WITH EXISTING TERRAZZO PATTERN
9 INSTALL APPROX. 8"H BAND OF CMT-12 TILE. REFER TO ELEVATION
10 PREPARE AND PAINT EXISTING FLOOR DECK AND STEEL ANGLE AT TOP OF CONCRETE WALLS. THIS INCLUDES BUT IS NOT LIMITED TO POWER TOOL CLEANING OF EXISTING STEEL TO REMOVE ALL LOOSE RUST, APPLICATION OF SEALER AND NEW PAINT SYSTEM (PAINT CODE 5.22B); DO NOT PAINT EXISTING STEEL BEAMS THAT WILL HAVE SPRAY APPLIED FIREPROOFING
11 NO FINISH WORK IN THIS AREA
12 CLEAN EXISTING STRUCTURAL STEEL COMPONENTS; PREP EXISTING PAINTED SURFACE AS REQUIRED FOR ADHESION OF NEW COATING SYSTEM. SPOT PRIME/TREAT ALL AREAS OF EXISTING RUST OR SURFACE BLEMISHES AS PART OF PREPARATION STEPS & PROVIDE NEW PAINT SYSTEM PER SPECIFICATIONS
13 ALL POOL FLOOR, BASE, AND WALL TILE WITHIN SPACE INDICATED WITH HEAVY DASHED LINE IS TO BE PROVIDED BY DIVISION 13, POOL CONTRACTOR
14 REPAINT EXISTING CMU WALL, P-1
15 PAINT METAL COLUMN, P-3
16 PAINT UNDERSIDE OF STAIR, P-10
17 INSTALL NEW NOSING TRIM ON EXISTING CONCRETE STEPS, REFER TO DETAIL 6/A8.22 FOR ADDITIONAL INFORMATION
18 WALL TILE AND INSTALLATION TO BE PROVIDED BY DIV. 9 CONTRACTOR
19 INSTALL SCHOOL LOGO IN BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION & 10/A8.21 FOR TILE DETAIL. INCLUDE CMT-12 ON BENCH AND STEP EDGES
20 INSTALL AREA OF CMT-2 ON BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION; INCLUDE CMT-12 ON STEP EDGES
21 HIGH PERFORMANCE COATINGS REQUIRED IN THIS ROOM, REFER TO PAINT TYPE GENERAL NOTES ON SHEET A9S.01
22 CMT-2 WALL TILE WITH CMT-13 & 14 STRIPES. REFER TO 2/A8.14
23 PAINT VISIBLE PORTION OF CHASE/MECHANICAL DUCTWORK, P-23
24 CMT-2 & 14 ON STAIR. REFER TO DETAIL 11/A8.21
25 SEE 5/A8.22 FOR RTF INSTALLATION PATTERN
26 INSTALL SCHLUTER QUADEC TRIM AT ALL OUTSIDE CORNERS AND SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAILS ON A8.22
27 INSTALL SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAIL ON A8.22
28 PAINT INDICATED METAL HANDRAIL/ GUARDRAIL/ STAIR/ SHIPS LADDER, P-2
29 METAL COLUMN COVER
30 THICKSET FLOOR TILE IN CMT-TILED AREA IN THIS ROOM ONLY

FLOOR PATTERN LEGEND

NOTE: NOT ALL FLOORING HAS HATCH PATTERN

- ETF-1
- ETF-2
- ETF-4

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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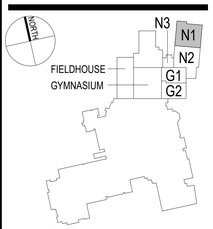

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PINE 12017 STATE OF INDIANA No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N1 - LOWER LEVEL FINISH PLAN

A8.01

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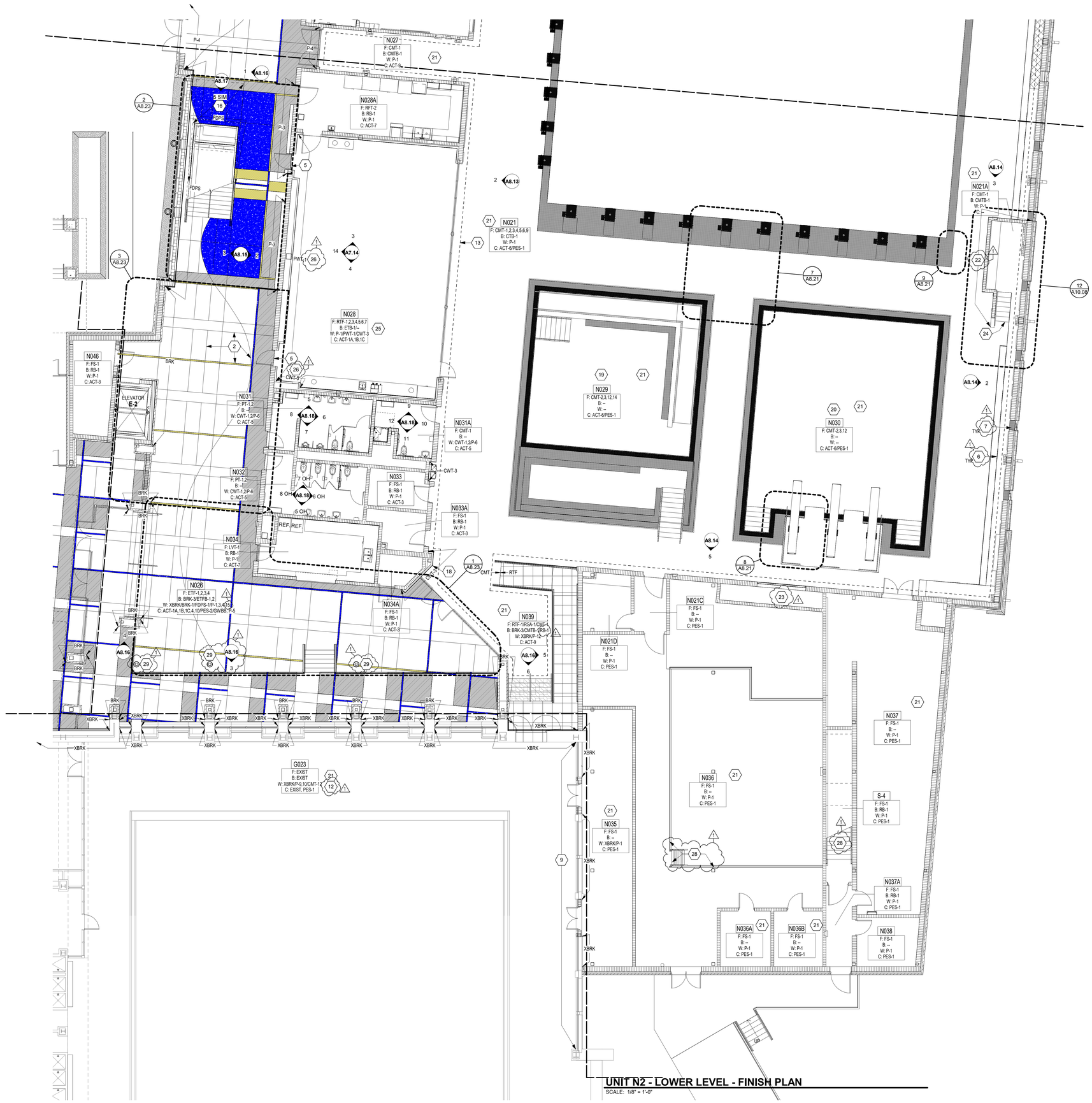

UNIT N2 - LOWER LEVEL - FINISH PLAN

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

ROOM LEGEND - LOWER LEVEL UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N021	POOL DECK	13162 SF
N021A	TIMING	140 SF
N021C	VESTIBULE	74 SF
N021D	VIDEO DISTRIBUTION	114 SF
N022	POOL	14163 SF
N026	LOWER CONCOURSE	8296 SF
N027	POOL CORRIDOR	383 SF
N028	HOSPITALITY	1668 SF
N028A	FOOD PREP	397 SF
N029	THERAPY POOL	1470 SF
N030	DIVING	1449 SF
N031	RESTROOM	219 SF
N032	RESTROOM	229 SF
N033	TECHNOLOGY	92 SF
N033A	A/V STORAGE	80 SF
N034	CONCESSIONS	150 SF
N034A	ELECTRICAL	49 SF
N035	POOL STORAGE	538 SF
N036	POOL EQUIPMENT	2789 SF
N036A	POOL EQUIPMENT	118 SF
N036B	POOL EQUIPMENT	114 SF
N037	POOL STORAGE	1139 SF
N037A	VESTIBULE	89 SF
N038	FIRE RISER	124 SF
N039	PASSAGE	690 SF
S-4	STAIR	166 SF

GENERAL FINISH NOTES

A. SEALANT SHALL BE APPLIED AT ALL MATERIAL TRANSITIONS, BACKSPLASHES, AND DOOR FRAMES. ALL LOCATIONS WHERE NEW FINISH ABUTS A DISSIMILAR MATERIAL.
B. REMOVE AND REINSTALL EXISTING DEVICE FACEPLATES, SWITCH FACEPLATES, TECHNOLOGY FACEPLATES, AND CLOCKS.
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D. INSTALL RESILIENT TRANSITION STRIP BETWEEN NEW FLOOR FINISH AND EXISTING FLOOR FINISH.
E. PROVIDE NEW RESILIENT TRANSITION STRIPS AT EXPOSED EDGE OF NEW FLOOR FINISH TO EXISTING FLOOR FINISH.
F. PAINT ALL SIDES (VERT. AND HORZ.) OF BULKHEAD/SOFFIT COLOR INDICATED (UNO).
G. EXISTING INTERIOR DOOR FRAMES ARE TO REMAIN. DO NOT PAINT.
H. PAINT ALL NEW INTERIOR DOOR FRAMES TO MATCH EXISTING DOOR FRAME COLOR. PAINT ON ALL FACES (PAINT CODE #5.12).
I. PATCH AND REPAIR ALL HOLES AND IMPERFECTIONS, TO RECEIVE NEW FINISHES.
J. PROVIDE ANODIZED ALUMINUM SPECIAL PROFILE TRANSITION SYSTEM BETWEEN CERAMIC MOSAIC FLOOR TILE AND CARPET.
K. NOT USED.
L. AT BUILDING EXPANSION JOINTS, PROVIDE ALUMINUM JOINT PLATE COVER. SEE A1 SERIES FOR LOCATIONS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
M. NOT USED.
N. NOT USED.
O. REFER TO A85.01 FOR LIST OF FINISHES AND ADDITIONAL GENERAL NOTES.
P. REFER TO A85.01 FOR ELEVATOR FINISHES.
Q. REFER TO A1 ARCHITECTURAL SERIES FOR ALL WALL MATERIAL TYPES.
R. COORDINATE CONTROL JOINTS IN CONCRETE FLOOR SLAB WITH STRUCTURAL DRAWINGS.
S. REFER TO A8.21 FOR DEPTH MARKING, NO DIVING, AND BENCH SIGNAGE TILE DETAILS. REFER TO PL SERIES FOR LOCATIONS.
T. NOT USED.
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FLOOR PATTERN/FINISH KEY NOTES

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4 TRANSITION FROM CMT8 TO DRF BASE. SEE DETAIL ON A8.23
5 INSTALL DFO-1 FILM ON DOOR LITE. REFER TO DOOR SCHEDULE FOR SIZE.
6 CMT-2 ON BENCH RISER AND TREAD. INCLUDE NOSING TRIM. REFER TO DETAIL 2/A8.22
7 CMT-2 SILL WITH BULLNOSE EDGE. REFER TO DETAIL 2/A8.22
8 NEW EPOXY TERRAZZO DIVIDER STRIPS TO ALIGN WITH EXISTING TERRAZZO PATTERN.
9 INSTALL APPROX. 8"H BAND OF CMT-12 TILE. REFER TO ELEVATION
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20 INSTALL AREA OF CMT-2 ON BOTTOM OF POOL TANK. REFER TO PL DRAWINGS FOR LOCATION. INCLUDE CMT-12 ON STEP EDGES
21 HIGH PERFORMANCE COATINGS REQUIRED IN THIS ROOM. REFER TO PAINT TYPE GENERAL NOTES ON SHEET A85.01
22 CMT-2 WALL TILE WITH CMT-13 & 14 STRIPES. REFER TO 2/A8.14
23 PAINT VISIBLE PORTION OF CHASE/MECHANICAL DUCTWORK, P-13
24 CMT-2 & 14 ON STAIR. REFER TO DETAIL 11/A8.21
25 SEE 5/A8.22 FOR RTF INSTALLATION PATTERN.
26 INSTALL SCHLUTER QUADEC TRIM AT ALL OUTSIDE CORNERS AND SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAILS ON A8.22
27 INSTALL SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAIL ON A8.22
28 PAINT INDICATED METAL HANDRAIL/ GUARDRAIL/ STAIR/ SHIPS LADDER, P-2
29 METAL COLUMN COVER
30 THICKSET FLOOR TILE IN CMT-TILED AREA IN THIS ROOM ONLY

FLOOR PATTERN LEGEND

NOTE: NOT ALL FLOORING HAS HATCH PATTERN

ETF-1
ETF-2
ETF-4

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

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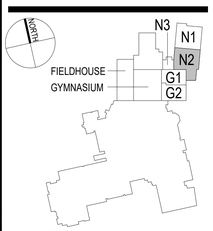

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE
REGISTERED
No. 4169
STATE OF
INDIANA
ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N2 - LOWER LEVEL FINISH PLAN

A8.02

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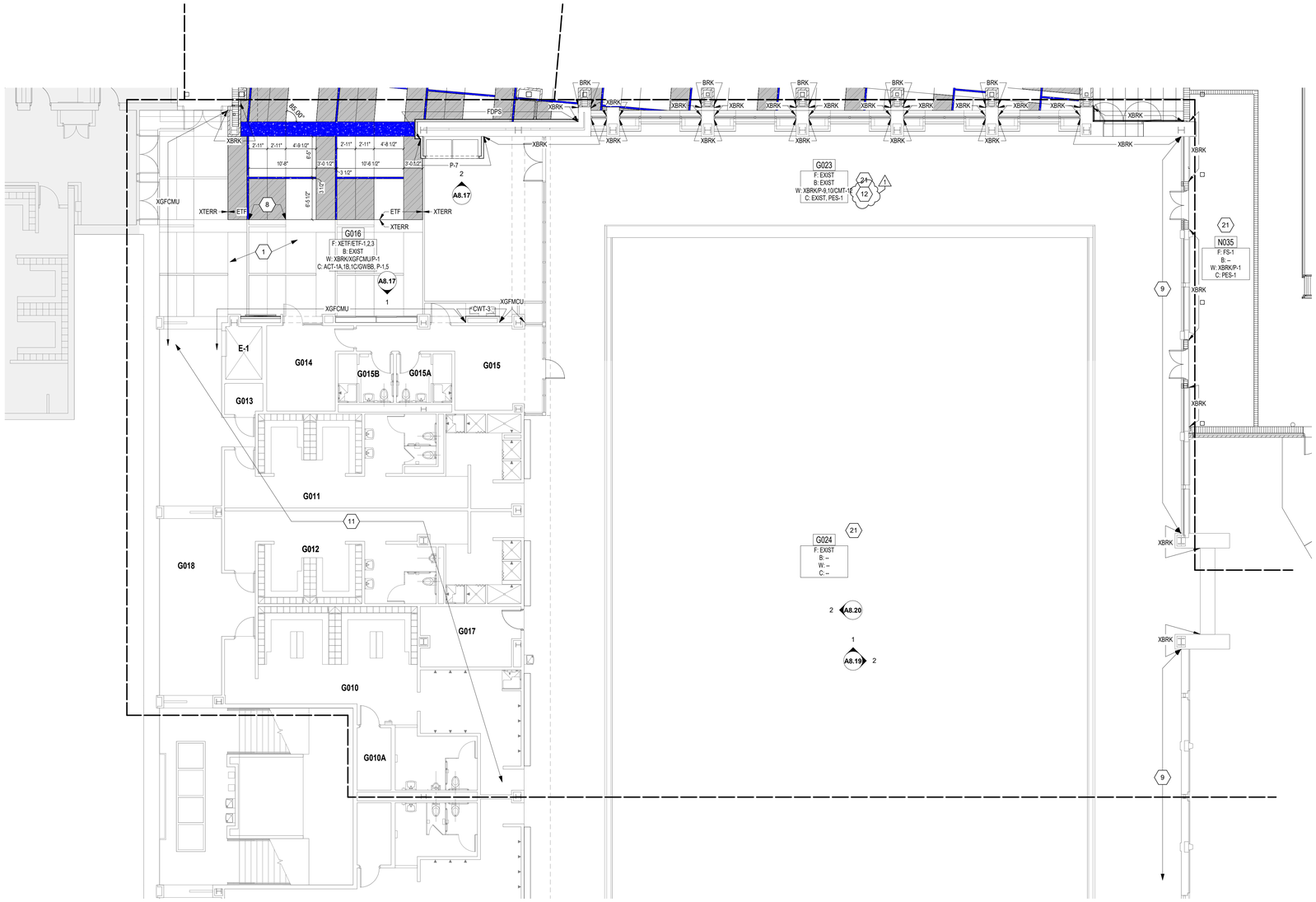
ROOM LEGEND - LOWER LEVEL UNIT G1

ROOM NO.	ROOM NAME	AREA (SF)
E-1	ELEVATOR	50 SF
G010	MEN'S TEAM LOCKER ROOM	730 SF
G010A	OFFICE	53 SF
G011	WOMEN'S COMMUNITY LOCKER ROOM	558 SF
G012	MEN'S COMMUNITY LOCKER ROOM	556 SF
G013	ELEVATOR EQUIPMENT	29 SF
G014	OFFICE	159 SF
G015	POOL OFFICE	246 SF
G015A	TOILET	66 SF
G015B	TOILET	66 SF
G016	LOBBY	1917 SF
G017	OFFICE	143 SF
G018	CORRIDOR	1712 SF
G023	POOL DECK	8849 SF
G024	POOL	12968 SF



UNIT G1 - LOWER LEVEL - FINISH PLAN

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

GENERAL FINISH NOTES

A. SEALANT SHALL BE APPLIED AT ALL MATERIAL TRANSITIONS, BACKSPLASHES, AND DOOR FRAMES. ALL LOCATIONS WHERE NEW FINISH ABUTS A DISSIMILAR MATERIAL.
B. REMOVE AND REINSTALL EXISTING DEVICE FACEPLATES, SWITCH FACEPLATES, TECHNOLOGY FACEPLATES, AND CLOCKS.
C. EXISTING ITEMS TO REMAIN AND NEW FINISHES APPLIED AROUND INCLUDE BUT NOT LIMITED TO THERMOSTATS, AND FIRE EXTINGUISHER CABINETS (UNO).
D. INSTALL RESILIENT TRANSITION STRIP BETWEEN NEW FLOOR FINISH AND EXISTING FLOOR FINISH. PROVIDE NEW RESILIENT TRANSITION STRIPS AT EXPOSED EDGE OF NEW FLOOR FINISH TO EXISTING FLOOR FINISH.
E. PAINT ALL SIDES (VERT. AND HORZ.) OF BULKHEAD/SOFFIT COLOR INDICATED (UNO).
F. EXISTING INTERIOR DOOR FRAMES ARE TO REMAIN. DO NOT PAINT.
G. PAINT ALL NEW INTERIOR DOOR FRAMES TO MATCH EXISTING DOOR FRAME COLOR. PAINT ON ALL FACES (PAINT CODE #5.12).
H. PATCH AND REPAIR ALL HOLES AND IMPERFECTIONS, TO RECEIVE NEW FINISHES.
I. PROVIDE ANODIZED ALUMINUM SPECIAL PROFILE TRANSITION SYSTEM BETWEEN CERAMIC MOSAIC FLOOR TILE AND CARPET.
J. NOT USED.
K. AT BUILDING EXPANSION JOINTS, PROVIDE ALUMINUM JOINT PLATE COVER. SEE A1 SERIES FOR LOCATIONS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
L. NOT USED.
M. NOT USED.
N. REFER TO A8S.01 FOR LIST OF FINISHES AND ADDITIONAL GENERAL NOTES.
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P. REFER TO A1 ARCHITECTURAL SERIES FOR ALL WALL MATERIAL TYPES.
Q. COORDINATE CONTROL JOINTS IN CONCRETE FLOOR SLAB WITH STRUCTURAL DRAWINGS.
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6 CMT-2 ON BENCH RISER AND TREAD, INCLUDE NOSING TRIM, REFER TO DETAIL 2/A8.22
7 CMT-2 SILL WITH BULLNOSE EDGE, REFER TO DETAIL 2/A8.22
8 NEW ETERNO TERRAZZO DIVIDER STRIPS TO ALIGN WITH EXISTING TERRAZZO PATTERN
9 INSTALL APPROX. 8"H BAND OF CMT-12 TILE, REFER TO ELEVATION
10 PREPARE AND PAINT EXISTING FLOOR DECK AND STEEL ANGLE AT TOP OF CONCRETE WALLS. THIS INCLUDES BUT IS NOT LIMITED TO POWER TOOL CLEANING OF EXISTING STEEL TO REMOVE ALL LOOSE RUST, APPLICATION OF SEALER AND NEW PAINT SYSTEM (PAINT CODE 5.22B). DO NOT PAINT EXISTING STEEL BEAMS THAT WILL HAVE SPRAY APPLIED FIREPROOFING
11 NO DISH WORK IN THIS AREA
12 CLEAN EXISTING STRUCTURAL STEEL COMPONENTS, PREP EXISTING PAINTED SURFACE AS REQUIRED FOR ADHESION OF NEW COATING SYSTEM. SPOT PRIME/TREAT ALL AREAS OF EXISTING RUST OR SURFACE BLEMISHES AS PART OF PREPARATION STEPS & PROVIDE NEW PAINT SYSTEM PER SPECIFICATIONS
13 ALL POOL FLOOR, BASE, AND WALL TILE WITHIN SPACE INDICATED WITH HEAVY DASHED LINE IS TO BE PROVIDED BY DIVISION 13, POOL CONTRACTOR
14 REPAINT EXISTING CMU WALL, P-1
15 PAINT METAL COLUMN, P-3
16 PAINT UNDERSIDE OF STAIR, P-10
17 INSTALL NEW NOSING TRIM ON EXISTING CONCRETE STEPS, REFER TO DETAIL 6/A8.22 FOR ADDITIONAL INFORMATION
18 WALL TILE AND INSTALLATION TO BE PROVIDED BY DIV. 9 CONTRACTOR
19 INSTALL SCHOOL LOGO IN BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION & 10/A8.21 FOR TILE DETAIL. INCLUDE CMT-12 ON BENCH AND STEP EDGES
20 INSTALL AREA OF CMT-2 ON BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION; INCLUDE CMT-12 ON STEP EDGES
21 HIGH PERFORMANCE COATINGS REQUIRED IN THIS ROOM, REFER TO PAINT TYPE GENERAL NOTES ON SHEET A8S.01
22 CMT-2 WALL TILE WITH CMT-13 & 14 STRIPES. REFER TO 2/A8.14
23 PAINT VISIBLE PORTION OF CHASE/MECHANICAL DUCTWORK, P-13
24 CMT-2 & 14 ON STAIR. REFER TO DETAIL 11/A8.21
25 SEE 5/A8.22 FOR ETF INSTALLATION PATTERN
26 INSTALL SCHLUTER QUADEC TRIM AT ALL OUTSIDE CORNERS AND SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAILS ON A8.22
27 INSTALL SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAIL ON A8.22
28 PAINT INDICATED METAL HANDRAIL/ GUARDRAIL/ STAIR/ SHIPS LADDER, P-2
29 METAL COLUMN COVER
30 THICKSET FLOOR TILE IN CMT-TILED AREA IN THIS ROOM ONLY

FLOOR PATTERN LEGEND

NOTE: NOT ALL FLOORING HAS HATCH PATTERN

ETF-1
ETF-2
ETF-4

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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ARCHITECT
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317.848.0966 WWW.FHAI.COM
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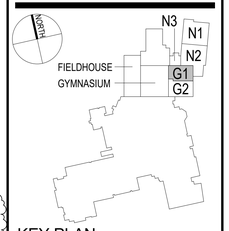

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE
LICENSED
No. 4169
STATE OF INDIANA
ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G1 - LOWER LEVEL FINISH PLAN

A8.04

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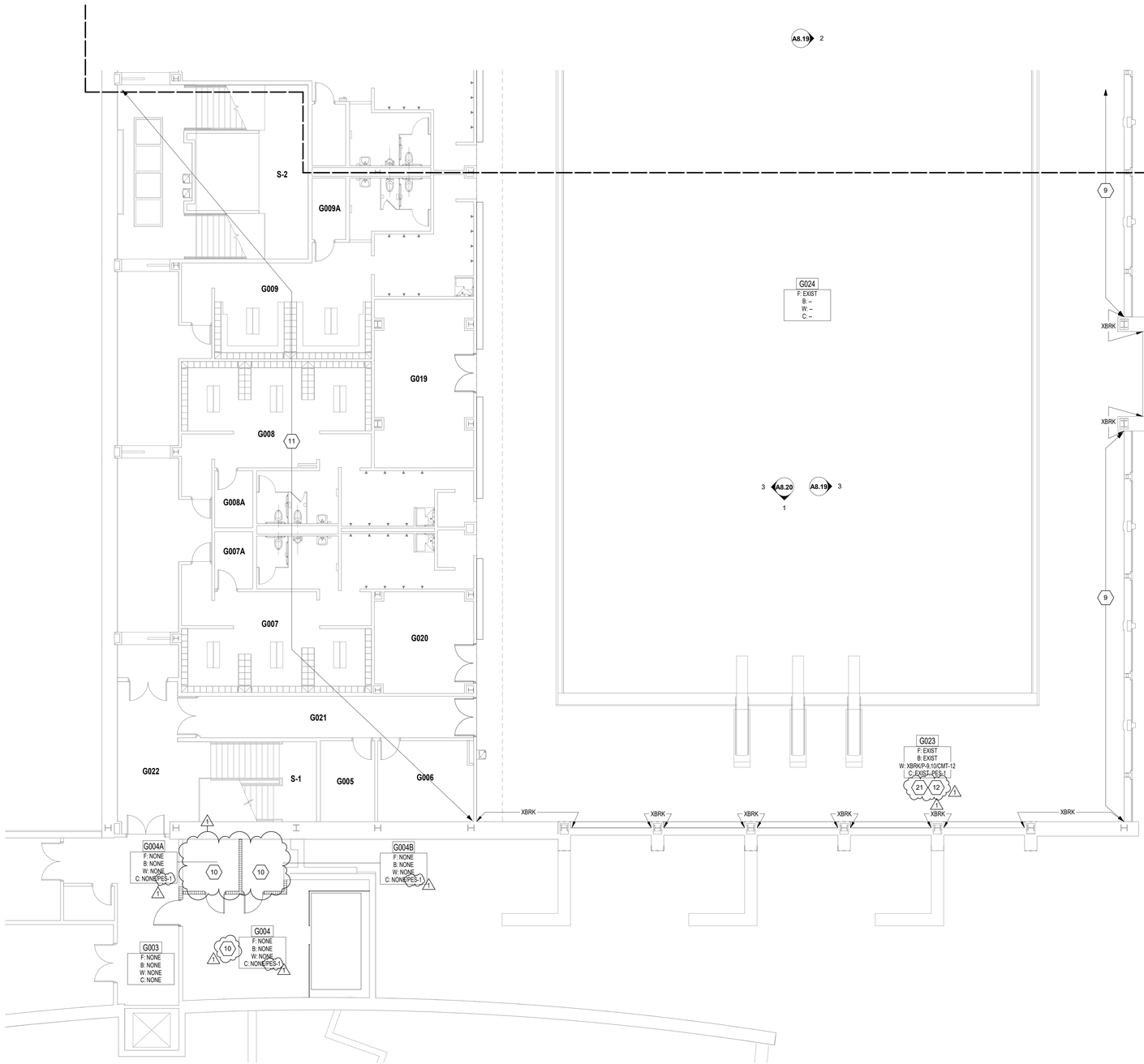

UNIT G2 - LOWER LEVEL - FINISH PLAN

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

ROOM LEGEND - LOWER LEVEL UNIT G2

ROOM NO.	ROOM NAME	AREA (SF)
G003	PASSAGE	330 SF
G004	FILTER ROOM	510 SF
G004A	FILTER ROOM	76 SF
G004B	FILTER ROOM	61 SF
G005	STORAGE	114 SF
G006	ELECTRICAL	197 SF
G007	MEN'S LOCKER ROOM	738 SF
G008	WOMEN'S LOCKER ROOM	765 SF
G009	WOMEN'S TEAM LOCKER ROOM	726 SF
G009A	OFFICE	53 SF
G019	STORAGE	421 SF
G020	POOL STORAGE	252 SF
G021	CORRIDOR	293 SF
G022	PASSAGE	309 SF
G023	POOL DECK	8649 SF
G024	POOL	12968 SF
S-1	STAIR	231 SF
S-2	STAIR	529 SF

GENERAL FINISH NOTES

A. SEALANT SHALL BE APPLIED AT ALL MATERIAL TRANSITIONS, BACKSPLASHES, AND DOOR FRAMES. ALL LOCATIONS WHERE NEW FINISH ABUTS A DISSIMILAR MATERIAL.
B. REMOVE AND REINSTALL EXISTING DEVICE FACEPLATES, SWITCH FACEPLATES, TECHNOLOGY FACEPLATES, AND CLOCKS.
C. EXISTING ITEMS TO REMAIN AND NEW FINISHES APPLIED AROUND INCLUDE BUT NOT LIMITED TO THERMOSTATS, AND FIRE EXTINGUISHER CABINETS (UNO).
D. INSTALL RESILIENT TRANSITION STRIP BETWEEN NEW FLOOR FINISH AND EXISTING FLOOR FINISH.
E. PROVIDE NEW RESILIENT TRANSITION STRIPS AT EXPOSED EDGE OF NEW FLOOR FINISH TO EXISTING FLOOR FINISH.
F. PAINT ALL SIDES (VERT. AND HORZ.) OF BULKHEAD/SOFFIT COLOR INDICATED (UNO).
G. EXISTING INTERIOR DOOR FRAMES ARE TO REMAIN. DO NOT PAINT.
H. PAINT ALL NEW INTERIOR DOOR FRAMES TO MATCH EXISTING DOOR FRAME COLOR. PAINT ON ALL FACES (PAINT CODE #5.12).
I. PATCH AND REPAIR ALL HOLES AND IMPERFECTIONS, TO RECEIVE NEW FINISHES.
J. PROVIDE ANODIZED ALUMINUM SPECIAL PROFILE TRANSITION SYSTEM BETWEEN CERAMIC MOSAIC FLOOR TILE AND CARPET.
K. NOT USED.
L. AT BUILDING EXPANSION JOINTS, PROVIDE ALUMINUM JOINT PLATE COVER; SEE A1 SERIES FOR LOCATIONS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
M. NOT USED.
N. NOT USED.
O. REFER TO A8S.01 FOR LIST OF FINISHES AND ADDITIONAL GENERAL NOTES.
P. REFER TO A8S.01 FOR ELEVATOR FINISHES.
Q. REFER TO A1 ARCHITECTURAL SERIES FOR ALL WALL MATERIAL TYPES.
R. COORDINATE CONTROL JOINTS IN CONCRETE FLOOR SLAB WITH STRUCTURAL DRAWINGS.
S. REFER TO A8.21 FOR DEPTH MARKING, NO DIVING, AND BENCH SIGNAGE TILE DETAILS. REFER TO PL SERIES FOR LOCATIONS.
T. NOT USED.
U. ALL WALLS SCHEDULED TO RECEIVE FDPS SYSTEM MUST BE PRIMED PRIOR TO SYSTEM INSTALLATION.

FLOOR PATTERN/FINISH KEY NOTES

1 EXISTING EPOXY TERRAZZO FLOORING TO REMAIN, PROTECT DURING CONSTRUCTION
2 LINE REPRESENTS TERRAZZO DIVIDER STRIP, TYP. ARCHITECT TO PROVIDE CAD FILE FOR CURVE LAYOUT. REFER TO ENLARGED PLANS FOR ADDITIONAL INFORMATION
3 INSTALL SLIP-RESISTANT NOSINGS ALONG EGRESS STEPS AND SEATING TREADS. REFER TO DETAIL 7/A8.22 FOR ADDITIONAL INFORMATION
4 TRANSITION FROM CMT8 TO DRY BASE, SEE DETAIL ON A8.22
5 INSTALL DFO-1 FILM ON DOOR LITE, REFER TO DOOR SCHEDULE FOR SIZE
6 CMT-2 ON BENCH RISER AND TREAD, INCLUDE NOSING TRIM, REFER TO DETAIL 2/A8.22
7 CMT-2 SILL WITH BULLNOSE EDGE, REFER TO DETAIL 2/A8.22
8 KERF EVERY TWO COURSES OVER STRIPS TO ALIGN WITH EXISTING TERRAZZO PATTERN
9 INSTALL APPROX. 8"H BAND OF CMT-12 TILE, REFER TO ELEVATIONS
10 PREPARE AND PAINT EXISTING FLOOR DECK AND STEEL ANGLE AT TOP OF CONCRETE WALLS. THIS INCLUDES BUT IS NOT LIMITED TO POWER TOOL CLEANING OF EXISTING STEEL TO REMOVE ALL LOOSE RUST, APPLICATION OF SEALER AND NEW PAINT SYSTEM (PAINT CODE 5.228); DO NOT PAINT EXISTING STEEL BEAMS THAT WILL HAVE SPRAY APPLIED FIREPROOFING
11 NO FINISH WORK IN THIS AREA
12 CLEAN EXISTING STRUCTURAL STEEL COMPONENTS; PREP EXISTING PAINTED SURFACE AS REQUIRED FOR ADHESION OF NEW COATING SYSTEM, SPOT PRIME/TREAT ALL AREAS OF EXISTING RUST OR SURFACE BLEMISHES AS PART OF PREPARATION STEPS & PROVIDE NEW PAINT SYSTEM PER SPECIFICATIONS
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15 PAINT METAL COLUMN, P-3
16 PAINT UNDERSIDE OF STAIR, P-10
17 INSTALL NEW NOSING TRIM ON EXISTING CONCRETE STEPS, REFER TO DETAIL 6/A8.22 FOR ADDITIONAL INFORMATION
18 WALL TILE AND INSTALLATION TO BE PROVIDED BY DIV. 9 CONTRACTOR
19 INSTALL SCHOOL LOGO IN BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION & 10/A8.21 FOR TILE DETAIL; INCLUDE CMT-12 ON BENCH AND STEP EDGES
20 INSTALL AREA OF CMT-2 ON BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION; INCLUDE CMT-12 ON STEP EDGES
21 HIGH PERFORMANCE COATINGS REQUIRED IN THIS ROOM, REFER TO PAINT TYPE GENERAL NOTES ON SHEET A8S.01
22 CMT-2 WALL TILE WITH CMT-13 & 14 STRIPES; REFER TO 2/A8.14
23 PAINT VISIBLE PORTION OF CHASE/MECHANICAL DUCTWORK, P-13
24 CMT-2 & 14 ON STAIR, REFER TO DETAIL 11/A8.21
25 SEE 5/A8.22 FOR RTF INSTALLATION PATTERN
26 INSTALL SCHLUTER QUADEC TRIM AT ALL OUTSIDE CORNERS AND SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAILS ON A8.22
27 INSTALL SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL. SEE DETAIL ON A8.22
28 PAINT INDICATED METAL HANDRAIL/ GUARDRAIL/ STAIR/ SHIP'S LADDER, P-2
29 METAL COLUMN COVER
30 THICKSET FLOOR TILE IN CMT-TILED AREA IN THIS ROOM ONLY

FLOOR PATTERN LEGEND

NOTE: NOT ALL FLOORING HAS HATCH PATTERN

ETF-1
ETF-2
ETF-4

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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ARCHITECT

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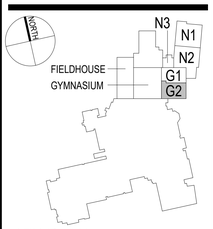

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PUNE
REGISTERED
No. 4169
STATE OF
INDIANA
ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G2 - LOWER LEVEL FINISH PLAN

A8.05

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UNIT N2 - FIRST FLOOR - FINISH PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N103	UPPER CONCOURSE	6428 SF
N107	VOMITORIUM	390 SF
N108	WOMENS RESTROOM	658 SF
N110	MECHANICAL ROOM	4206 SF
S-4	STAIR	166 SF

GENERAL FINISH NOTES

A. SEALANT SHALL BE APPLIED AT ALL MATERIAL TRANSITIONS, BACKSPLASHES, AND DOOR FRAMES. ALL LOCATIONS WHERE NEW FINISH ABUTS A DISSIMILAR MATERIAL.
B. REMOVE AND REINSTALL EXISTING DEVICE FACEPLATES, SWITCH FACEPLATES, TECHNOLOGY FACEPLATES, AND CLOCKS.
C. EXISTING ITEMS TO REMAIN AND NEW FINISHES APPLIED AROUND INCLUDE BUT NOT LIMITED TO THERMOSTATS, AND FIRE EXTINGUISHER CABINETS (UNO).
D. INSTALL RESILIENT TRANSITION STRIP BETWEEN NEW FLOOR FINISH AND EXISTING FLOOR FINISH.
E. PROVIDE NEW RESILIENT TRANSITION STRIPS AT EXPOSED EDGE OF NEW FLOOR FINISH TO EXISTING FLOOR FINISH.
F. PAINT ALL SIDES (VERT. AND HORZ.) OF BULKHEAD/SOFFIT COLOR INDICATED (UNO).
G. EXISTING INTERIOR DOOR FRAMES ARE TO REMAIN. DO NOT PAINT.
H. PAINT ALL NEW INTERIOR DOOR FRAMES TO MATCH EXISTING DOOR FRAME COLOR. PAINT ON ALL FACES (PAINT CODE #5.12).
I. PATCH AND REPAIR ALL HOLES AND IMPERFECTIONS, TO RECEIVE NEW FINISHES.
J. PROVIDE ANODIZED ALUMINUM SPECIAL PROFILE TRANSITION SYSTEM BETWEEN CERAMIC MOSAIC FLOOR TILE AND CARPET.
K. NOT USED.
L. AT BUILDING EXPANSION JOINTS, PROVIDE ALUMINUM JOINT PLATE COVER. SEE A1 SERIES FOR LOCATIONS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
M. NOT USED.
N. NOT USED.
O. REFER TO A05.01 FOR LIST OF FINISHES AND ADDITIONAL GENERAL NOTES.
P. REFER TO A65.01 FOR ELEVATOR FINISHES.
Q. REFER TO A1 ARCHITECTURAL SERIES FOR ALL WALL MATERIAL TYPES.
R. COORDINATE CONTROL JOINTS IN CONCRETE FLOOR SLAB WITH STRUCTURAL DRAWINGS.
S. REFER TO A8.21 FOR DEPTH MARKING, NO DIVING, AND BENCH SIGNAGE TILE DETAILS. REFER TO PL SERIES FOR LOCATIONS.
T. NOT USED.
U. AS WALLS SCHEDULED TO RECEIVE FDPS SYSTEM MUST BE PRIMED PRIOR TO SYSTEM INSTALLATION.

FLOOR PATTERN/FINISH KEY NOTES

1 EXISTING EPOXY TERRAZZO FLOORING TO REMAIN, PROTECT DURING CONSTRUCTION
2 LINE REPRESENTS TERRAZZO DIVIDER STRIP. TYP- ARCHITECT TO PROVIDE CAD FILE FOR CURVE LAYOUT. REFER TO ENLARGED PLANS FOR ADDITIONAL INFORMATION
3 INSTALL SLIP-RESISTANT NOSINGS ALONG EGRESS STEPS AND SEATING TREADS, REFER TO DETAIL 7/A8.22 FOR ADDITIONAL INFORMATION
4 TRANSITION FROM CMT8 TO DRF BASE, SEE DETAIL ON A8.22
5 INSTALL DFO-1 FILM ON DOOR LITE, REFER TO DOOR SCHEDULE FOR SIZE
6 CMT-2 ON BENCH RISER AND TREAD, INCLUDE NOSING TRIM, REFER TO DETAIL 2/A8.22
7 CMT-2 SILL WITH BULLNOSE EDGE, REFER TO DETAIL 2/A8.22
8 NEW EPOXY TERRAZZO DIVIDER STRIPS TO ALIGN WITH EXISTING TERRAZZO PATTERN
9 INSTALL APPROX. 8"H BAND OF CMT-12 TILE, REFER TO ELEVATION
10 PREPARE AND PAINT EXISTING FLOOR DECK AND STEEL ANGLE AT TOP OF CONCRETE WALLS. THIS INCLUDES BUT IS NOT LIMITED TO POWER TOOL CLEANING OF EXISTING STEEL TO REMOVE ALL LOOSE RUST, APPLICATION OF SEALER AND NEW PAINT SYSTEM (PAINT CODE 5.228); DO NOT PAINT EXISTING STEEL BEAMS THAT WILL HAVE SPRAY APPLIED FIREPROOFING
11 NO CUSH WORK IN THIS AREA
12 CLEAN EXISTING STRUCTURAL STEEL COMPONENTS. PREP EXISTING PAINTED SURFACE AS REQUIRED FOR ADHESION OF NEW COATING SYSTEM. SPOT PRIME/TREAT ALL AREAS OF EXISTING RUST OR SURFACE BLEMISHES AS PART OF PREPARATION STEPS & PROVIDE NEW PAINT SYSTEM PER SPECIFICATIONS
13 ALL POOL, FLOOR, BASE, AND WALL TILE WITHIN SPACE INDICATED WITH HEAVY DASHED LINE IS TO BE PROVIDED BY DIVISION 13, POOL CONTRACTOR
14 REPAINT EXISTING CMU WALL, P-1
15 PAINT METAL COLUMN, P-3
16 PAINT UNDERSIDE OF STAIR, P-10
17 INSTALL NEW NOSING TRIM ON EXISTING CONCRETE STEPS, REFER TO DETAIL 6/A8.22 FOR ADDITIONAL INFORMATION
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19 INSTALL SCHOOL LOGO IN BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION & 10/A8.21 FOR TILE DETAIL; INCLUDE CMT-12 ON BENCH AND STEP EDGES
20 INSTALL AREA OF CMT-2 ON BOTTOM OF POOL TANK, REFER TO PL DRAWINGS FOR LOCATION; INCLUDE CMT-12 ON STEP EDGES
21 HIGH PERFORMANCE COATINGS REQUIRED IN THIS ROOM, REFER TO PAINT TYPE GENERAL NOTES ON SHEET A99.01
22 CMT-2 WALL TILE WITH CMT-13 & 14 STRIPES; REFER TO 2/A8.14
23 PAINT VISIBLE PORTION OF CHASE/MECHANICAL DUCTWORK, P-13
24 CMT-2 & 14 ON STAIR. REFER TO DETAIL 11/A8.21
25 SEE SIM 22 FOR R3F INSTALLATION PATTERN
26 INSTALL SCHLUTER QUADEC TRIM AT ALL OUTSIDE CORNERS AND SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL, SEE DETAILS ON A8.22
27 INSTALL SCHLUTER DILEX-AHKA WHERE TILE MEETS FLOORING MATERIAL, SEE DETAIL ON A8.22
28 PAINT INDICATED METAL HANDRAIL/ GUARDRAIL/ STAIR/ SHIP'S LADDER, P-2
29 METAL COLUMN COVER
30 THICKSET FLOOR TILE IN CMT-TILED AREA IN THIS ROOM ONLY

FLOOR PATTERN LEGEND

NOTE: NOT ALL FLOORING HAS HATCH PATTERN

ETF-1
ETF-2
ETF-4

VERIFICATION NOTE

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

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ARCHITECT
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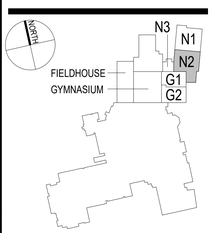

KEY PLAN

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE
No. 4169
STATE OF INDIANA
ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N2 - UPPER LEVEL FINISH PLAN

A8.07

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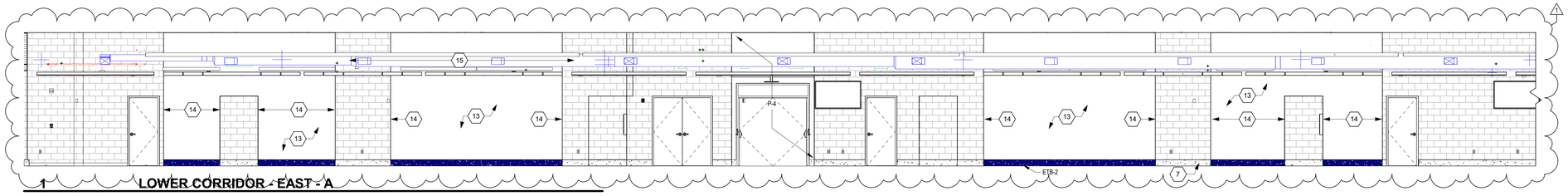
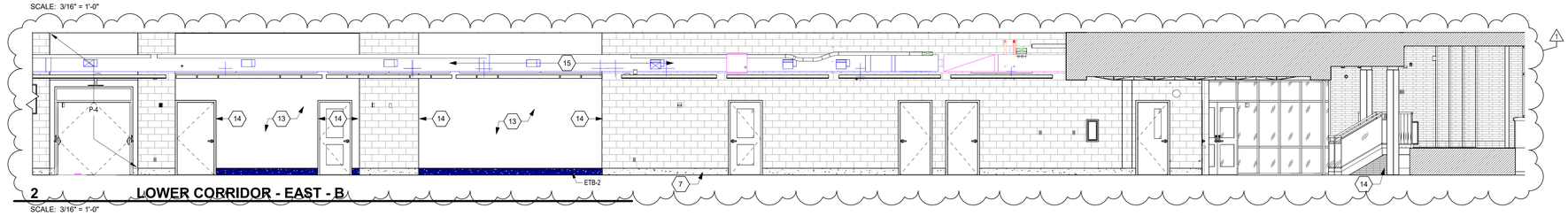


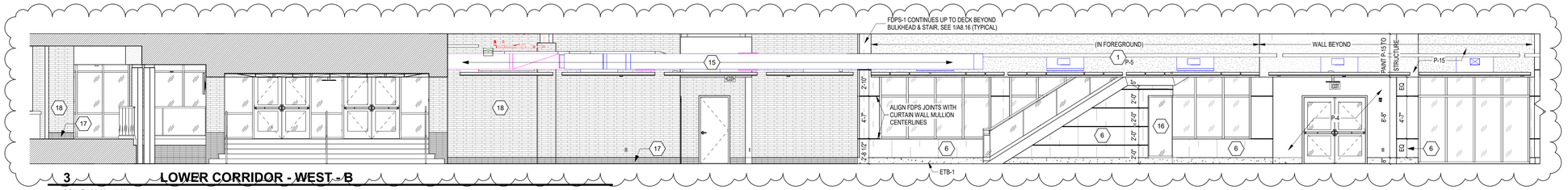
1 LOWER CORRIDOR - EAST - A

SCALE: 3/16" = 1'-0"



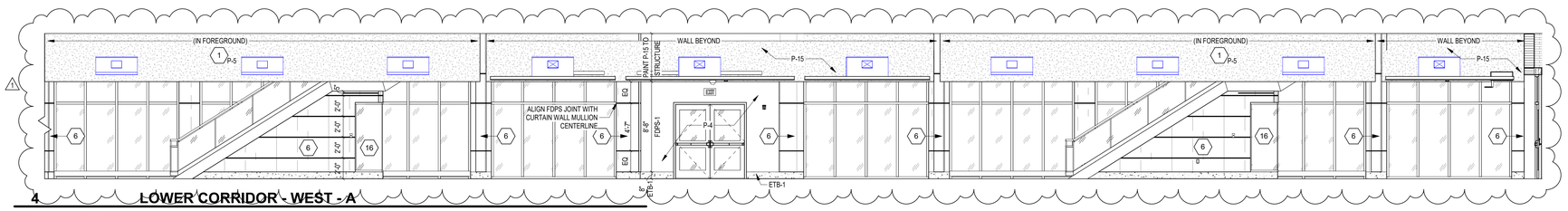
2 LOWER CORRIDOR - EAST - B

SCALE: 3/16" = 1'-0"



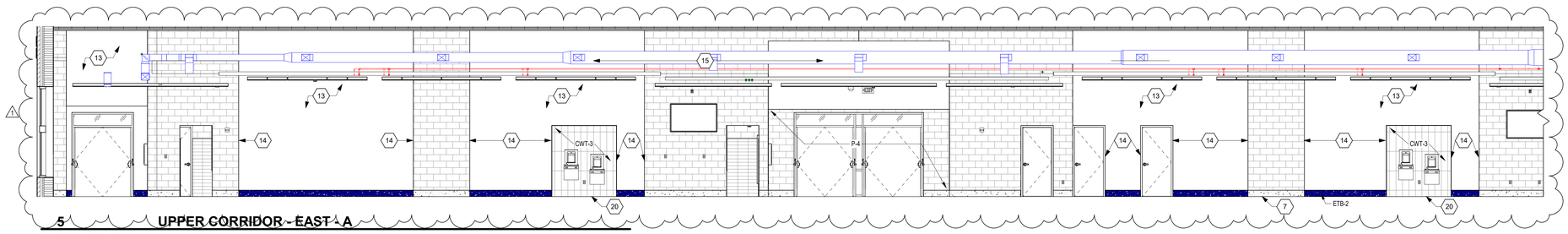
3 LOWER CORRIDOR - WEST - B

SCALE: 3/16" = 1'-0"



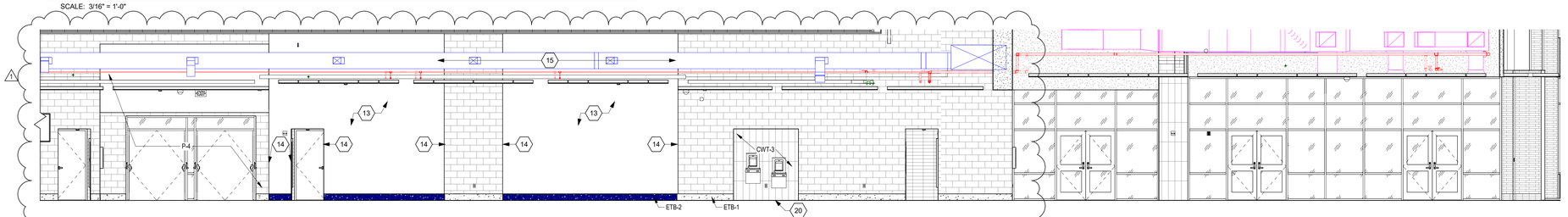
4 LOWER CORRIDOR - WEST - A

SCALE: 3/16" = 1'-0"



5 UPPER CORRIDOR - EAST - A

SCALE: 3/16" = 1'-0"



6 UPPER CORRIDOR - EAST - B

SCALE: 3/16" = 1'-0"

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INTERIOR ELEVATION NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

1. PAINT ALL SIDES OF BULKHEAD INDICATED COLOR
2. COILING DOOR
3. EXISTING BRICK TO REMAIN, DO NOT PAINT
4. EXISTING GLAZED BRICK BASE, DO NOT PAINT
5. EXISTING GFCMU, DO NOT PAINT
6. INSTALL FDPS-1, PRIME PAINT SUBSTRATE BEHIND FDPS
7. ETB-1
8. VENDING MACHINES, BY OWNER
9. INSTALL NEW CMT-12 TILE ABOVE EXISTING CMT BASE TO CONCEAL WHERE STEEL ANGLE SUPPORTS WERE CUT BACK TO WALL PLANE. TILE COLOR TO MATCH AND GROUT JOINTS TO ALIGN.
10. EXISTING TILE-FACED CMU BASE TO REMAIN, DO NOT PAINT
11. EXISTING GLASS BLOCK, DO NOT PAINT
12. PAINT ALL SIDES OF COLUMN, P-3
13. PAINT ALL SIDES OF GWB BUMPOUT, FROM FLOOR TO CEILING, P-3
14. INSTALL HEAVY DUTY ALUMINUM CORNER TRIM, PAINT IN FIELD ALONG WITH WALL, COLOR AS INDICATED ON A8 PLANS
15. PAINT EXPOSED STRUCTURE AND DUCTWORK, REFER TO FINISH PLANS FOR COLOR
16. BUILT IN DISPLAY CASE. REFER TO A7 PLANS AND A7.13 FOR DETAILS
17. NEW GLAZED BRICK BASE, BRK-3, DO NOT PAINT
18. NEW BRICK WALL, DO NOT PAINT
19. SCHLUTER OUTSIDE CORNER TRIM ON ALL CORNERS OF TILED COLUMN, SEE DETAIL ON A8.22
20. SCHLUTER BASE TRIM WHERE CWT MEETS FLOOR, SEE DETAIL ON A8.22
21. RUN CWT-3 DOWN TO TILE FLOOR, NO CMTB-1 BASE
22. SCHLUTER JOLLY TRIM, TYP; SEE DETAIL ON A8.22
23. SCHLUTER QUADEC CORNER TRIM, TYP; SEE DETAIL ON A8.22
24. TILE ACCENT BAND, SEE DETAIL 3/A8.22 FOR PATTERN
25. ACT-8 CANOPIES AND PENDANT LIGHT FIXTURES, REFER TO A5 SERIES AND ELECTRICAL DRAWINGS

VERIFICATION NOTE

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

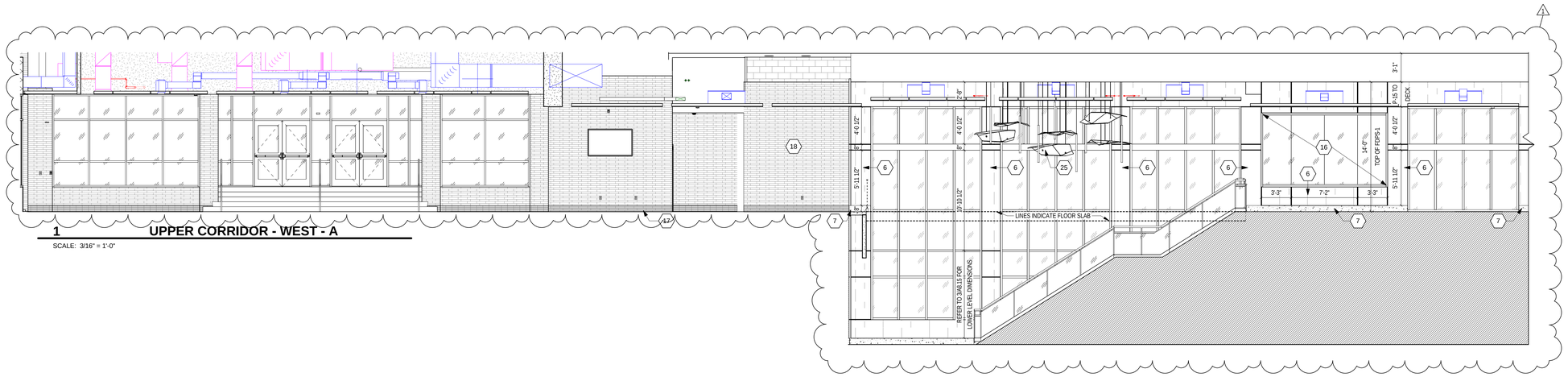
WILLIAM E. PAYNE
REGISTERED
No. 4169
STATE OF
INDIANA
ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

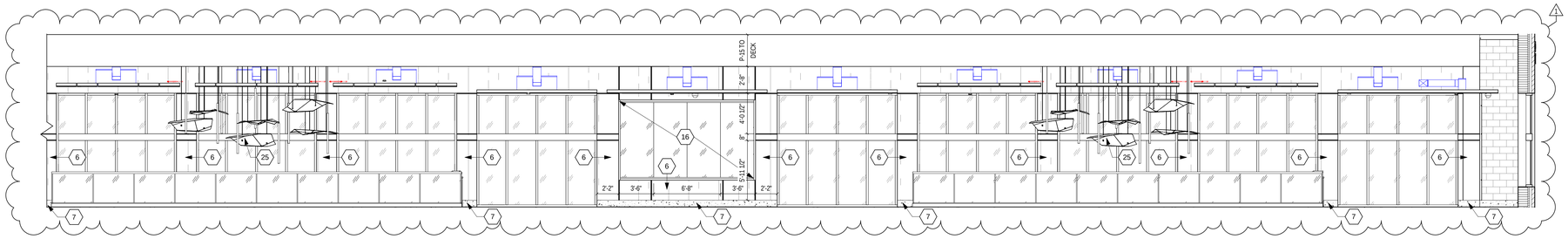
INTERIOR ELEVATIONS

A8.15



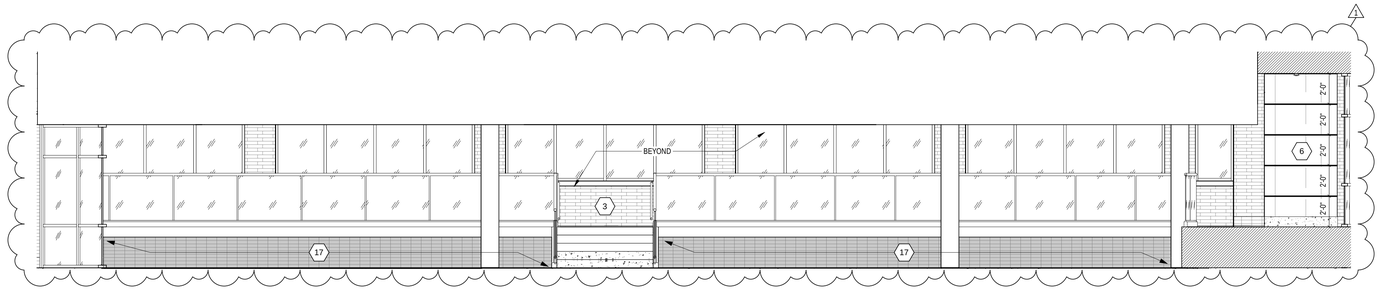
1 UPPER CORRIDOR - WEST - A

SCALE: 3/16" = 1'-0"



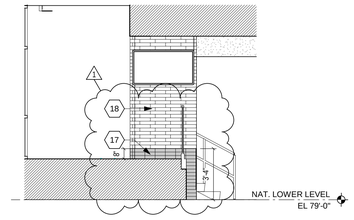
2 UPPER CORRIDOR - WEST - B

SCALE: 3/16" = 1'-0"



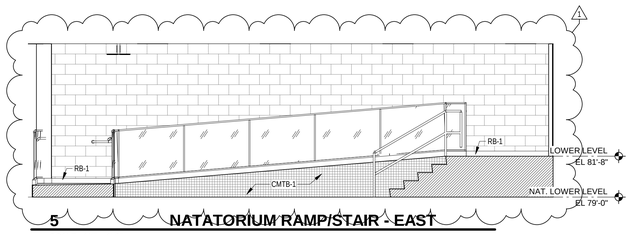
3 LOWER CONCOURSE - SOUTH

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



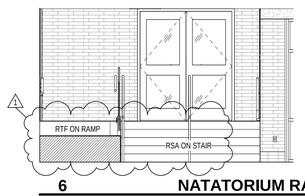
4 N026 SOUTH BRICK COLUMNS

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



5 NATATORIUM RAMP/STAIR - EAST

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



6 NATATORIUM RAMP/STAIR - SOUTH

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

INTERIOR ELEVATION NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

1. PAINT ALL SIDES OF BULKHEAD INDICATED COLOR
2. COILING DOOR
3. EXISTING BRICK TO REMAIN, DO NOT PAINT
4. EXISTING GLAZED BRICK BASE, DO NOT PAINT
5. EXISTING GFCMU, DO NOT PAINT
6. INSTALL FDPS-1, PRIME PAINT SUBSTRATE BEHIND FDPS
7. ETB-1
8. VENDING MACHINES, BY OWNER
9. INSTALL NEW CMT-12 TILE ABOVE EXISTING CMT BASE TO CONCEAL WHERE STEEL ANGLE SUPPORTS WERE CUT BACK TO WALL PLANE. TILE COLOR TO MATCH AND GROUT JOINTS TO ALIGN.
10. EXISTING TILE-FACED CMU BASE TO REMAIN, DO NOT PAINT
11. EXISTING GLASS BLOCK, DO NOT PAINT
12. PAINT ALL SIDES OF COLUMN, P-3
13. PAINT ALL SIDES OF GWB BUMPOUT, FROM FLOOR TO CEILING, P-3
14. INSTALL HEAVY DUTY ALUMINUM CORNER TRIM, PAINT IN FIELD ALONG WITH WALL, COLOR AS INDICATED ON A8 PLANS
15. PAINT EXPOSED STRUCTURE AND DUCTWORK, REFER TO FINISH PLANS FOR COLOR
16. BUILT IN DISPLAY CASE. REFER TO A7 PLANS AND A7.13 FOR DETAILS
17. NEW GLAZED BRICK BASE, BRK-3, DO NOT PAINT
18. NEW BRICK WALL, DO NOT PAINT
19. SCHLUTER OUTSIDE CORNER TRIM ON ALL CORNERS OF TILED COLUMN, SEE DETAIL ON A8.22
20. SCHLUTER BASE TRIM WHERE CWT MEETS FLOOR, SEE DETAIL ON A8.22
21. RUN CWT-3 DOWN TO TILE FLOOR, NO CMTB-1 BASE
22. SCHLUTER JOLLY TRIM, TYP; SEE DETAIL ON A8.22
23. SCHLUTER QUADEC CORNER TRIM, TYP; SEE DETAIL ON A8.22
24. TILE ACCENT BAND, SEE DETAIL 3/A8.22 FOR PATTERN
25. ACT-8 CANOPIES AND PENDANT LIGHT FIXTURES, REFER TO A9 SERIES AND ELECTRICAL DRAWINGS

VERIFICATION NOTE

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PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
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INTERIOR ELEVATIONS

A8.16

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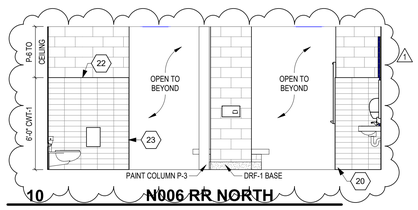
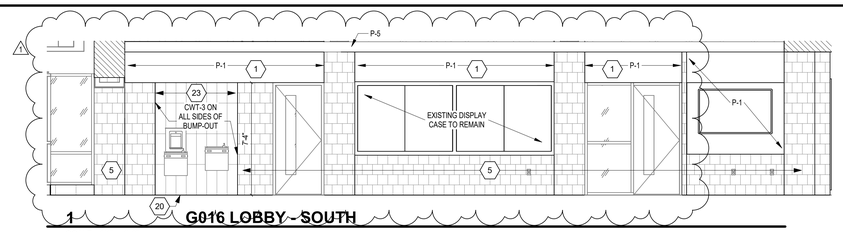


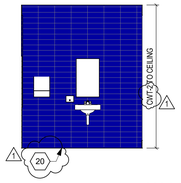
10 N006 RR NORTH

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



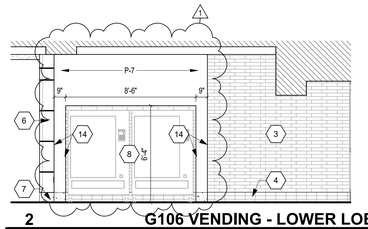
1 G016 LOBBY - SOUTH

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



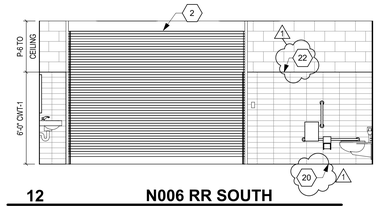
11 N006 RR EAST

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



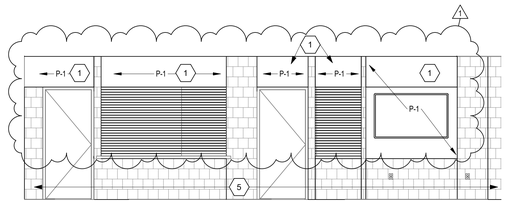
2 G106 VENDING - LOWER LOBBY

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



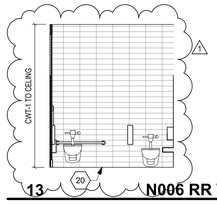
12 N006 RR SOUTH

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



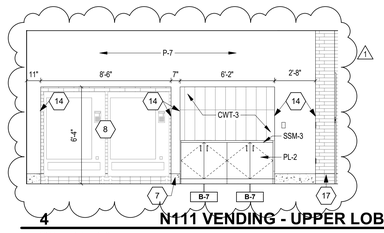
3 G101 LOBBY - SOUTH

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



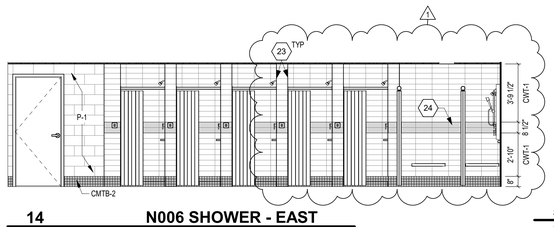
13 N006 RR WEST

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



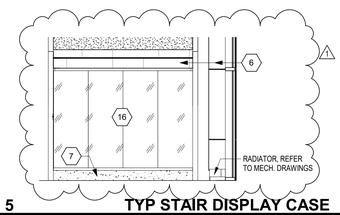
4 N111 VENDING - UPPER LOBBY

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



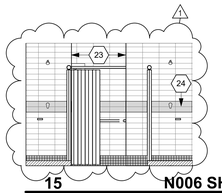
14 N006 SHOWER - EAST

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



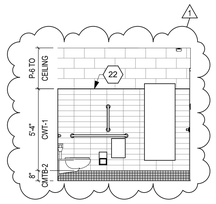
5 TYP STAIR DISPLAY CASE

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



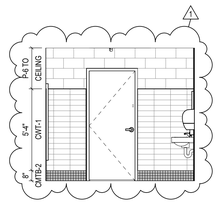
15 N006 SHOWER - SOUTH

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



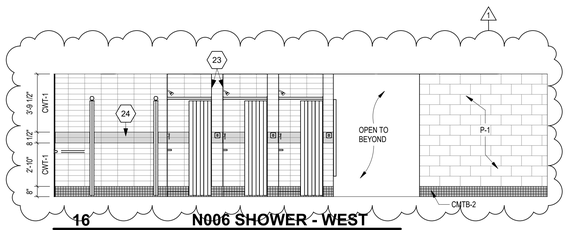
6 N004 RR - NORTH

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



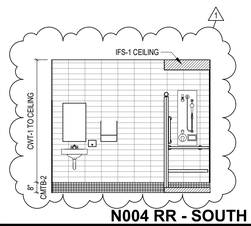
7 N004 RR - EAST

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



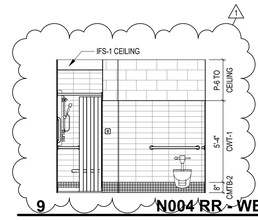
16 N006 SHOWER - WEST

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



8 N004 RR - SOUTH

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



9 N004 RR - WEST

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

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PROJECT ISSUE DATE: 12.17.2021

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INTERIOR ELEVATIONS

A8.17

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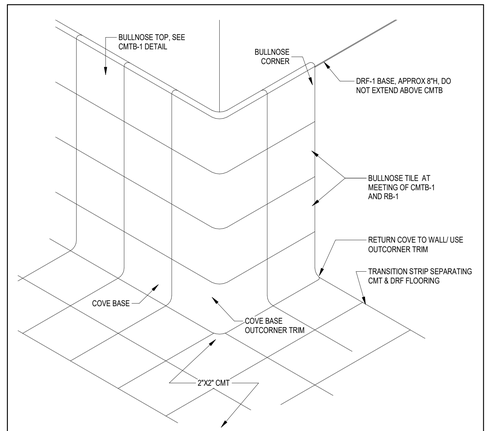
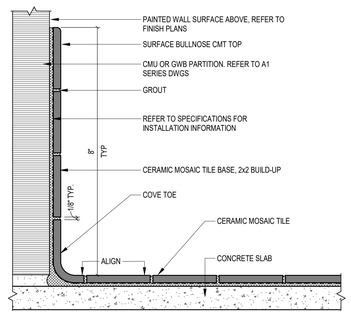


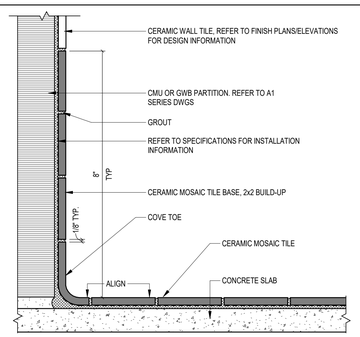
CMTB TO DRF TRANSITION DETAIL

- SCALE: NTS
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION



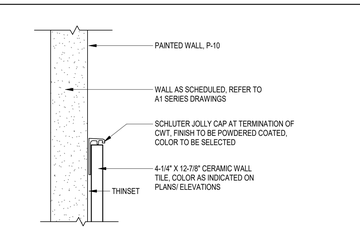
CMTB-1 & CMTB-2 WALL BASE DETAIL - PAINTED ABOVE

- SCALE: 6" = 1'-0"
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION
- REFER TO A8S.01 FOR COLOR SELECTION(S)



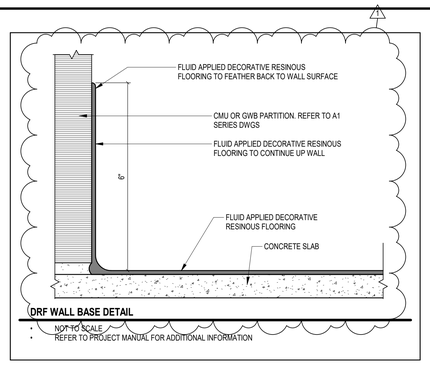
CMTB- 1 & CMTB-2 WALL BASE DETAIL - TILED ABOVE

- SCALE: 6" = 1'-0"
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION
- REFER TO A8S.01 FOR COLOR SELECTION(S)



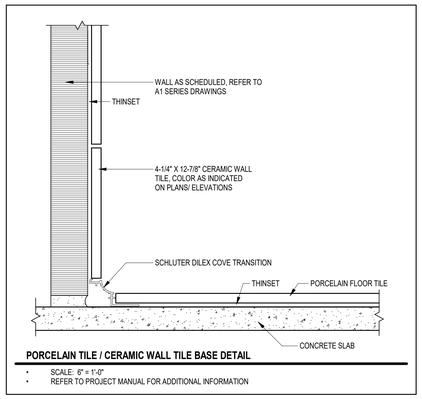
CERAMIC WALL TILE DETAIL - TERMINATION

- NOT TO SCALE
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION
- REFER TO A8 SERIES DRAWINGS FOR COLOR SELECTION(S) AND LOCATIONS



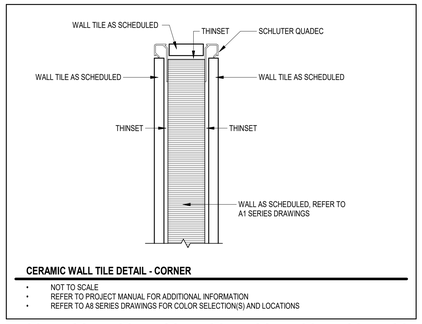
DRF WALL BASE DETAIL

- NOT TO SCALE
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION



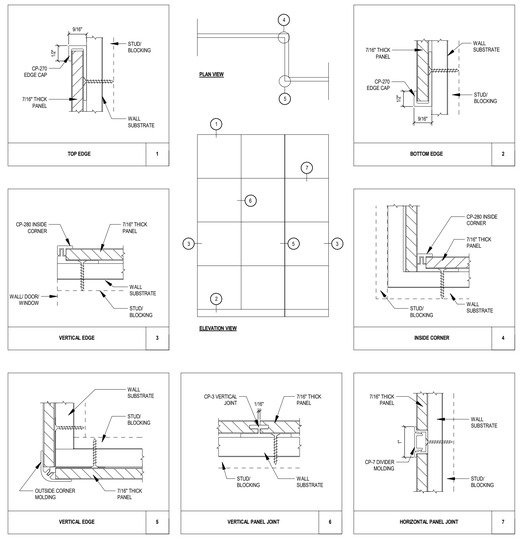
PORCELAIN TILE / CERAMIC WALL TILE BASE DETAIL

- SCALE: 6" = 1'-0"
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION



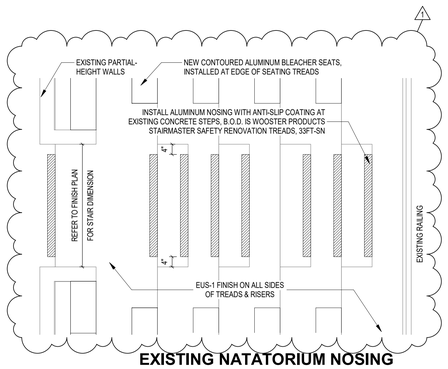
CERAMIC WALL TILE DETAIL - CORNER

- NOT TO SCALE
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION
- REFER TO A8 SERIES DRAWINGS FOR COLOR SELECTION(S) AND LOCATIONS



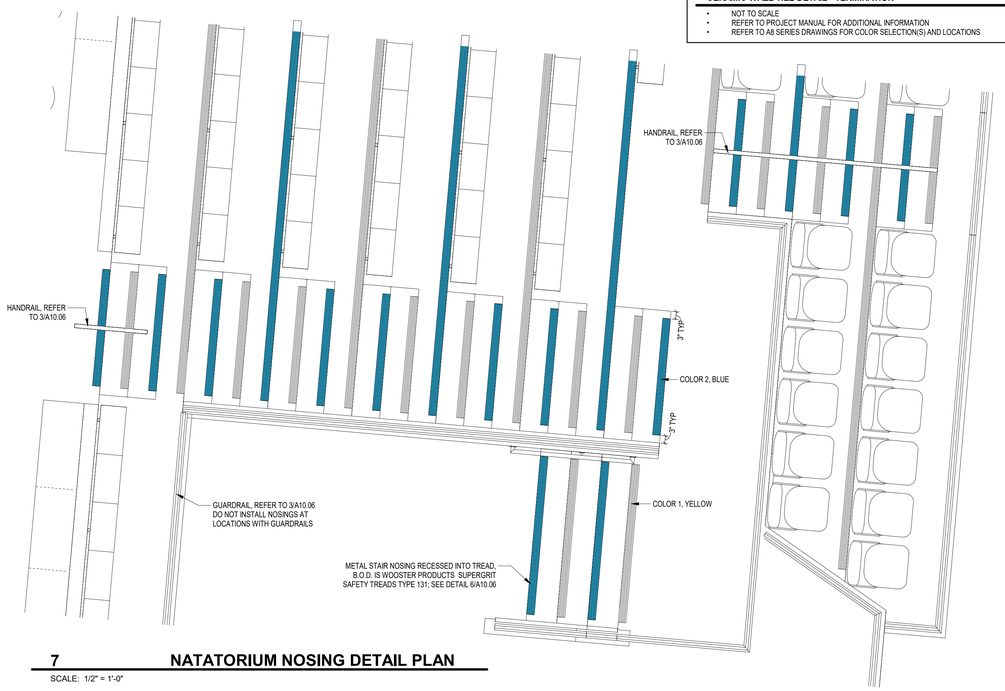
1 FDPS PANEL DETAILS

N.T.S.



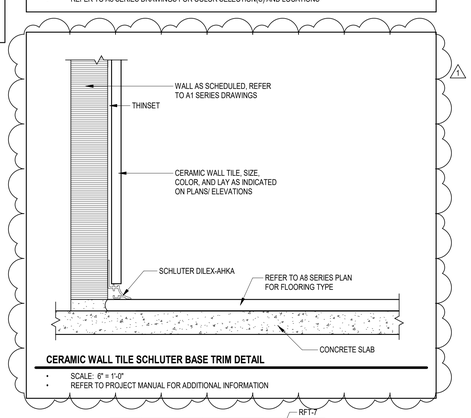
6 EXISTING NATATORIUM NOSING DETAIL PLAN

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



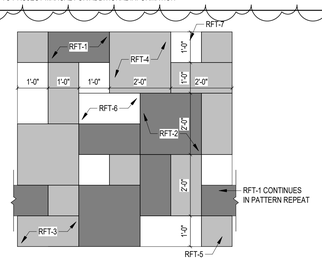
7 NATATORIUM NOSING DETAIL PLAN

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



CERAMIC WALL TILE SCHLUTER BASE TRIM DETAIL

- SCALE: 6" = 1'-0"
- REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION

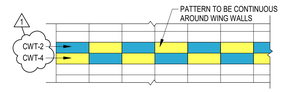


5 RUBBER TILE PATTERN

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

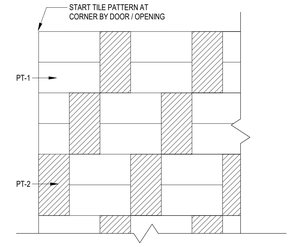
2 TILED BENCH DETAIL

SCALE: 3" = 1'-0"



3 TILE ACCENT BAND

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



4 FLOOR TILE PATTERN DETAIL

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

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

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CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE REGISTERED No. 4169 STATE OF INDIANA ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

INTERIOR DETAILS

A8.22

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LIST OF FINISHES

REFER TO A8 ARCH. DWG. SHEETS

FLOOR MATERIALS

CARPET TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
CART-1	JJ FLOORING - STORYLINE 7589	PLOT TWIST 7589-3013 / 12" X 48"

- ALL CARPET BACKING TO HAVE A MOISTURE RESISTANT BARRIER.
- INSTALLATION METHOD TO BE ASHLAR.

CERAMIC MOSAIC TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
CMT-1 (POOL DECK BLEND)	DALTILE "KEYSTONES"	45% MOONSHINE D117 / 2"X2"
	DALTILE "KEYSTONES"	25% DESERT GRAY D014 / 2"X2"
	DALTILE "KEYSTONES"	15% DESERT GRAY SPECKLE D200 / 2"X2"
	DALTILE "KEYSTONES"	5% SUEDE GRAY SPECKLE D208 / 2"X2"
	DALTILE "KEYSTONES"	5% SUEDE GRAY D182 / 2"X2"
	DALTILE "KEYSTONES"	5% GALAXY D023 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	MATCH DALTILE BLEND
CMT-2 (BENCH/NUMBERS)	DALTILE "KEYSTONES"	GALAXY D023 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	SAPPHIRE SKY R08 / 2"X2"
CMT-3 (POOL/BORDER)	DALTILE "KEYSTONES"	MOONSHINE D117 / 1"X1"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	ICE WHITE A25 / 1"X1"
CMT-4 (DEPTH MARKINGS)	DALTILE "KEYSTONES"	GALAXY D023, ABRASIVE / 1"X1"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	SAPPHIRE SKY R08, ABRASIVE / 1"X1"
CMT-5 (POOL BORDER ACCENT)	DALTILE "KEYSTONES"	SUEDE GRAY SPECKLE D208 / 2"X1"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	STORM GRAY SPECKLED A06 / 2"X1"
CMT-6 (POOL BORDER ACCENT)	DALTILE "KEYSTONES"	SUNSHINE D630 / 1"X1"
CMT-7 (POOL LANE LINES)	DALTILE "KEYSTONES"	BLACK D311 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	BLACK A34 / 2"X2"
CMT-8 (POOL LANE LINES)	DALTILE "KEYSTONES"	SUEDE GRAY D182 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	STORM GRAY A22 / 2"X2"
CMT-9 (POOL BORDER ACCENT)	DALTILE "KEYSTONES"	DESERT GRAY D014 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	**TO BE SELECTED** / 2"X2"
CMT-10 (POOL-15M STARTING)	DALTILE "KEYSTONES"	GROUP 4, TO BE SELECTED / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	GROUP 4, TO BE SELECTED / 2"X2"
CMT-11 (POOL-15M TURN)	DALTILE "KEYSTONES"	GROUP 4, TO BE SELECTED / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	GROUP 4, TO BE SELECTED / 2"X2"
CMT-12 (EXISTING POOL WALL)	DALTILE "KEYSTONES"	CASTLEROCK D618 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	CHARCOAL A33 / 2"X2"
CMT-13 (RR)	DALTILE "KEYSTONES"	SUEDE GRAY SPECKLE D208 / 2"X2"
	AMERICAN OLEAN "UNGLAZED COLORBODY"	STORM GRAY SPECKLED A06 / 2"X2"
CMT-14 (ACCENT)	DALTILE "KEYSTONES"	SUNSHINE D630 / 2"X2"

DECORATIVE RESINOUS FLOORING

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
DRF-1	GENERAL POLYMERS CERAMIC CARPET KEY RESIN COMPANY DUR-A-FLEX INC.	TO MATCH EXISTING LOWER LEVEL UNIT G LOCKER ROOMS

ENTRANCE CARPET TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
ECT-1	INTERFACE - SR899	104931 GRANITE

EPOXY TERRAZZO FLOORING

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
ETF-1 (GRAY)	REFER TO SPECIFICATIONS	35% DEMARCO BLUE #2, 35% DEMARCO BLUE #1, 10% DEMARCO BLUE #0, 5% MISSOURI BOTTICINO #2, 5% MISSOURI BOTTICINO #1, 5% MISSOURI BOTTICINO #0, 5% OXBLOOD #0 MATRIX: TERROXY - DAUPHIN GRAY 13B-2T
ETF-2 (BLUE)	REFER TO SPECIFICATIONS	TO MATCH EXISTING, SIMILAR TO: 35% NORTH CAROLINA BLUE GRAY #1, 40% NORTH CAROLINA BLUE GRAY #0, 5% OXBLOOD #0, 5% MISSOURI BOTTICINO #1, 5% MISSOURI BOTTICINO #0, 5% GEORGIA WHITE #0 MATRIX: TERROXY - COSMIC NAVY 76A-1A
ETF-3 (WHITE)	REFER TO SPECIFICATIONS	33% GEORGIA WHITE #2, 33% GEORGIA WHITE #1, 33% GEORGIA WHITE #0 MATRIX: GP - 654 WHITE
ETF-4 (GOLD)	REFER TO SPECIFICATIONS	100% CLEAR GLASS #1 MATRIX: TERROXY - GOURMET MUSTARD

- REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- COORDINATE COLOR SELECTION/VERIFICATION WITH ARCHITECT.
- MANUFACTURER TO SUBMIT ACTUAL PRODUCT SAMPLES AFTER SELECTION OF ALL ETF COLORS FOR VERIFICATION AND APPROVAL.

FLOOR SEALER

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
FS-1	REFER TO SPECIFICATIONS	CLEAR

FLUID APPLIED EPOXY/URETHANE FLOORING

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
EUS-1	REFER TO SPECIFICATIONS	CLEAR

LUXURY VINYL TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
LVT-1	MANNINGTON - NATURE'S PATHS ABSTRACT	RAINFALL MIST 12310 / 18" X 36" PLANK / 2.5MM THICK

PORCELAIN FLOOR TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
PT-1	DALTILE / FABRIC ART	MODERN LINEAR TAUPE ML62 (12"X24")
PT-2	DALTILE / FABRIC ART	MODERN TEXTILE TAUPE MT52 (12"X24")

RUBBER FLOOR TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION / SIZE
RFT-1	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 12"X24"
RFT-2	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 24"X24"
RFT-3	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 12"X24"
RFT-4	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 24"X24"
RFT-5	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 12"X12"
RFT-6	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 12"X24"
RFT-7	JOHNSONITE / MESTO CONFIGURATIONS	TO BE SELECTED / 12"X12"

RESILIENT STAIR ACCESSORIES

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
RSA-1	JOHNSONITE / ANGLE FIT STAIR TREADS WITH INTEGRATED RISER	VIHNTR / COLOR TO BE SELECTED / HAMMERED TEXTURE VISUALLY IMPAIRED GRIT TAPE INSERT

VINYL CUSHIONED TUFTED TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
VCTT-1	FORBO "FLOTEX"	142014 MARINE / 10"X40"

BASE MATERIALS

GLAZED BRICK BASE

8"H BRICK BASE (3 BRICKS HIGH)

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
BRK-3	GLEN-GERY BRICK	G437 PEWTER GRAY / MODULAR

CERAMIC MOSAIC TILE BASE

8"H COVE BASE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
CMTB-1	DALTILE "KEYSTONES" AMERICAN OLEAN "UNGLAZED COLORBODY"	DESERT GRAY D014 / 2"X2" LIGHT SMOKE A43 / 2"X2"
CMTB-2	DALTILE "KEYSTONES" AMERICAN OLEAN "UNGLAZED COLORBODY"	SUEDE GRAY SPECKLE D208 / 2"X2" STORM GRAY SPECKLED A06 / 2"X2"

- SEE A8.22 FOR CMTB DETAILS

PRE-CAST EPOXY TERRAZZO BASE

8"H STRAIGHT BASE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
ETB-1 (WHITE)	REFER TO SPECIFICATIONS	MATCH ETF-3
ETB-2 (BLUE)	REFER TO SPECIFICATIONS	MATCH ETF-2

RESILIENT BASE

4"H COVE BASE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
RB-1	JOHNSONITE FLEXCO ROPPE MANNINGTON	TO BE SELECTED TO BE SELECTED TO BE SELECTED TO BE SELECTED

DECORATIVE RESINOUS FLOORING BASE

6"H INTEGRAL BASE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
DRF-1	MATCH DRF-1 FLOORING	

WALL FINISHES

BRICK

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
BRK-1 (INT./EXT.) BRK-2 (EXT. ONLY)	MATCH EXISTING TO BE SELECTED	MATCH EXISTING TO BE SELECTED

CERAMIC WALL TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
CWT-1	DALTILE / COLOR WHEEL LINEAR	K175 BISCUIT (4.25" X 12.875")
CWT-2	DALTILE / COLOR WHEEL LINEAR	1174 SEA BREEZE (4.25" X 12.875")
CWT-3	DALTILE / COLOR WHEEL LINEAR	1174 SEA BREEZE (8" X 24")
CWT-4	DALTILE / COLOR WHEEL LINEAR	1012 MUSTARD (4.25" X 12.875")

- PROVIDE METAL COVE TRIM AT FLOOR TO WALL AND INSIDE CORNER WALL TO WALL TRANSITIONS, TYPICAL UNLESS NOTED OTHERWISE.

FRAMED DECORATIVE PANEL SYSTEM

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
FDPS-1	MARLITE / SIEVA LARGE PANEL SYSTEM	WILSONART SATIN STAINLESS 4830K-18 LINEARITY FINISH NEVAMAR SILVER ALU METALX TEXTURED MXT003T ARBORITE BRUSHED ALUMINUM P623 MX

PAINT

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
P-1 (FIELD)	BENJAMIN MOORE	BM 855 CLOUD COVER
P-2 (DOOR FRAMES)	SHERWIN WILLIAMS	SW7069 IRON ORE
P-3 (CARMEL BLUE)	BENJAMIN MOORE	BM 2064-20 PATRIOT BLUE
P-4 (CARMEL GOLD)	SHERWIN WILLIAMS	TO BE SELECTED
P-5 (CEILINGS-LIGHT)	SHERWIN WILLIAMS	TO BE SELECTED
P-6 (RESTROOM)	PPG	PPG1000-2 ROCKY ROAD
P-7 (NEUTRAL ACCENT)	SHERWIN WILLIAMS	TO BE SELECTED
P-8 (EXIST NATATORIUM)	SHERWIN WILLIAMS	TO BE SELECTED
P-9 (EXIST NATATORIUM)	SHERWIN WILLIAMS	TO BE SELECTED
P-10 (DISPLAY CASE)	SHERWIN WILLIAMS	TO BE SELECTED
P-11 (STAIRS)	SHERWIN WILLIAMS	TO BE SELECTED
P-12 (NATATORIUM)	SHERWIN WILLIAMS	TO BE SELECTED
P-13 (CHASE)	SHERWIN WILLIAMS	SW6258 TRICORN BLACK
P-14 (OFFICES)	SHERWIN WILLIAMS	SW9166 DRIFT OF MIST
P-15 (ABOVE FDPS)	SHERWIN WILLIAMS	TO BE SELECTED

PORCELAIN WALL TILE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
PWT-1	VIVA "300"	NATURALE RETT / 7-7/8" X 47-1/4"

SOUND ABSORBING WALL UNITS

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
SAW-1	GORDON "PATTERN C BAFFLE/PERFORATED"	TO BE SELECTED / 2" THICK
SAW-2	GORDON "PATTERN C BAFFLE/PERFORATED"	TO BE SELECTED / 2" THICK

INTERIOR FINISH SYSTEM

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
IFS-2	REFER TO SPECIFICATIONS	TO BE SELECTED FROM MANUFACTURER'S STANDARD COLORS

MISCELLANEOUS FINISHES

INTERIOR FRP DOORS

- COLOR TO BE SELECTED FROM MANUFACTURER'S STANDARD FINISHES.

INTERIOR WOOD DOORS/ INTERIOR WOOD TRIM

- STAIN ALL WOOD DOORS TO MATCH EXISTING WOOD DOORS.
- WOOD SPECIES TO BE PLAIN-SLICED RED OAK, STAIN TO MATCH VT INDUSTRIES SERENGETI
- PROVIDE WOOD STAIN SAMPLES FOR VERIFICATION.

GROUT

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
GT-1 (CMT)	LATICRETE MAPEI TEC	ARCHITECT TO SELECT FROM MANUFACTURER'S FULL RANGE OF STANDARD AND DESIGNER COLORS
GT-2 (TILED BENCH)	LATICRETE MAPEI TEC	ARCHITECT TO SELECT FROM MANUFACTURER'S FULL RANGE OF STANDARD AND DESIGNER COLORS
GT-3 (CWT)	LATICRETE MAPEI TEC	ARCHITECT TO SELECT FROM MANUFACTURER'S FULL RANGE OF STANDARD AND DESIGNER COLORS
GT-4 (PWT)	LATICRETE MAPEI TEC	ARCHITECT TO SELECT FROM MANUFACTURER'S FULL RANGE OF STANDARD AND DESIGNER COLORS
GT-5 (POOL)	LATICRETE MAPEI TEC	ARCHITECT TO SELECT FROM MANUFACTURER'S FULL RANGE OF STANDARD AND DESIGNER COLORS

RESILIENT MOLDING ACCESSORIES

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
RMA-1	JOHNSONITE FLEXCO ROPPE MANNINGTON	TO BE SELECTED TO BE SELECTED TO BE SELECTED TO BE SELECTED

CEILING MATERIALS

ACOUSTICAL CEILING TILES

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
ACT-1A (LOBBY)	ARMSTRONG / TORSION SPRING SHAPES #8216R01M1XXX	STANDARD, TO BE SELECTED FLAT SQUARE, M21 PERFORATION
ACT-1B (LOBBY)	ARMSTRONG / TORSION SPRING SHAPES #8219T01M1XXX	STANDARD, TO BE SELECTED 45 DEGREE TRIANGLE 01, M21 PERFORATION
ACT-1C (LOBBY)	ARMSTRONG / TORSION SPRING SHAPES #8219T02M1XXX	STANDARD, TO BE SELECTED 45 DEGREE TRIANGLE 02, M21 PERFORATION
ACT-2 (OFFICES)	ARMSTRONG / OPTIMA 3354	WHITE / 24" X 24"
ACT-3 (STORAGE)	ARMSTRONG / SCHOOL ZONE FINE FISSURED 1713	WHITE / 24" X 24"
ACT-4 (CORRIDORS)	ARMSTRONG / TORSION SPRING M15 PERFORATION	WHITELUME WHA / 24" X 72" INCLUDE 7147 EXTRUDED PERIMETER TRIM
ACT-5 (RESTROOM)	ARMSTRONG / TUNDRA 301	WHITE / 24" X 24"
ACT-6 (NATATORIUM)	CERTAINTEED / 300C LINEAR PLANK PERN #193 PERFORATION	STANDARD POWDER-COAT PAINT COLOR INCLUDE ACOUSTICAL POLYWRAPPED FIBERGLASS
ACT-7 (CONCESSION)	ARMSTRONG / KITCHEN ZONE 673	WHITE / 24" X 24"
ACT-8 (ACCENT CANOPIES)	3-FORM / SHAPES / ALTA RTA 400.12 - INCLUDES MOUNTING HARDWARE	ONE SHAPE TO BE VARIA SOLID COLOR (TRANSLUCENT) ONE SHAPE TO BE VARIA COLORWEAVE/INTERLAYER PATTERN
ACT-9 (NATATORIUM)	ARMSTRONG / CERAMAGUARD FINE FISSURED 607	WHITE / 24" X 24"
ACT-10 (CORRIDOR CLOUDS)	ARMSTRONG / OPTIMA 3354	WHITE / 24" X 24" / INCLUDE 4"H AXIOM PERIMETER TRIM

PAINT EXPOSED STRUCTURE

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
PES-1	REFER TO SPECIFICATIONS	TO BE SELECTED
PES-2	REFER TO SPECIFICATIONS	TO BE SELECTED

INTERIOR FINISH SYSTEM

MATERIAL ABBREVIATION	MATERIAL/MANUFACTURER	COLOR SELECTION
IFS-1	REFER TO SPECIFICATIONS	TO BE SELECTED FROM MANUFACTURER'S STANDARD COLORS

MATERIAL & FINISH GENERAL NOTES

GENERAL

A. REFER TO FINISH PLAN DRAWINGS AND DETAILS (A8 SERIES) FOR MATERIALS, PATTERNS AND COLORS.
B. REFER TO A7S.01 LIST OF FINISHES FOR ADDITIONAL FINISHES NOT NOTED ON A8S.01.
C. ELEVATOR CAB TO BE PLASTIC LAMINATE, PL-1, WITH VINYL CUSHIONED TUFTED TILE, VCTT-1, FLOORING.

FLOORING

A. CENTER FLOORING TILE AND PATTERN IN ROOM UNLESS OTHERWISE INDICATED ON FINISH PLANS.
B. ALIGN EDGE OF FINISHED FLOOR MATERIAL WITH EDGE OF WALL OR CASEWORK.
C. FLOOR FINISH MATERIAL TRANSITIONS SHALL OCCUR UNDER THE CENTER OF THE DOOR UNLESS OTHERWISE INDICATED, WHERE THE FLOORING MATERIAL CHANGES FROM ROOM TO ROOM.
D. EXTEND FLOOR MATERIAL AND PATTERN UNDER ALL OPEN TO THE FLOOR CASEWORK AND FURNITURE.
E. COORDINATE CONTROL JOINTS IN CONCRETE SLAB WITH STRUCTURAL DRAWINGS AND FINISH FLOORING INSTALLER.
F. REFER TO FLOOR PLANS, RESTROOM ENLARGED PLANS, PLUMBING DRAWINGS, ETC. FOR FLOOR DRAIN LOCATIONS.
G. TERRAZZO STAIRS TO HAVE ABRASIVE GRIT STRIP AT NOSING. PAINT STRINGERS P-11. SEE DETAIL ON A9X.XX.
H. AT BUILDING EXPANSION JOINTS (IF APPLICABLE) PROVIDE PRE-FABRICATED MOVEMENT PROFILE SYSTEM IN MORTAR BED. PROVIDE SCHLUTER DILEX-EDP OR APPROVED EQUAL. TYPICAL AT ALL LOCATIONS.

CERAMIC MOSAIC TILE

A. ALL CERAMIC MOSAIC TILE FLOORS TO HAVE 8"H CERAMIC MOSAIC TILE COVE BASE (BUILT-UP) UNLESS OTHERWISE INDICATED.
B. COLOR OF 8"H CERAMIC MOSAIC COVE BASE TO BE CMT-1 OR CMT-2 AS INDICATED. REFER TO FINISH PLANS AND DRAWING A8.22 FOR ADDITIONAL INFORMATION.
C. GROUT AT ALL CERAMIC MOSAIC TILE LOCATIONS TO BE GT-1 OR GT-2 AS INDICATED.
D. GROUT INSIDE COMPETITION, THERAPY, AND DIVING POOLS TO BE GT-5.
E. AT BUILDING EXPANSION JOINTS, PROVIDE PRE-FABRICATED MOVEMENT PROFILE SYSTEM AT CMT FLOORING. PROVIDE SCHLUTER DILEX-AKWS OR APPROVED EQUAL. TYPICAL AT ALL LOCATIONS.
F. PROVIDE ANODIZED ALUMINUM SPECIAL PROFILE TRANSITION SYSTEM BETWEEN CERAMIC MOSAIC FLOOR TILE AND VINYL CUSHION TUFTED TILE. PROVIDE SCHLUTER RENO-TK OR APPROVED EQUAL.
G. FIELD TILE INSIDE COMPETITION POOL TO BE CMT-3. LANE MARKING TILES TO BE AS FOLLOWS:
   a. MAIN COURSE LINES (50m): CMT-7 & 8
   b. CROSS COURSE LINES: CMT-7 & 8
   c. 15m LANE MARKINGS: CMT-10
   d. 15m LANE MARKINGS (TURN): CMT-11
   e. STEP EDGE MARKINGS: CMT-12
H. FIELD TILE INSIDE THERAPY POOL TO BE CMT-3. ADDITIONAL COLORS AS FOLLOWS:
   a. STEP EDGE/BENCH EDGE MARKINGS: CMT-12
   b. SCHOOL "C" LOGO: CMT-2 WITH CMT-14 OUTLINE
I. FIELD TILE INSIDE DIVING TANK TO BE CMT-3. ADDITIONAL COLORS AS FOLLOWS:
   a. DIVING AREA AT BOTTOM OF TANK: CMT-2
J. FIELD TILE ON POOL DECK TO BE CMT-1, CUSTOM TILE BLEND. ADDITIONAL COLORS AS FOLLOWS:
   a. LANE NUMBERS: CMT-2
   b. DEPTH MARKINGS/WARNINGS: CMT-4
   c. SEE A8.21 FOR ADDITIONAL DECORATIVE TILE DETAILS

CERAMIC WALL TILE

A. GROUT AT ALL CERAMIC WALL TILE LOCATIONS TO BE GT-3 AS INDICATED.

PORCELAIN WALL TILE

A. GROUT AT ALL PORCELAIN WALL TILE LOCATIONS TO BE GT-4 AS INDICATED.

WALL BASE

A. RUBBER BASE (RB-1) TO BE INSTALLED AT ALL LUXURY VINYL TILE (LVT) LOCATIONS, CARPET TILE LOCATIONS, AND IN ROOMS WITH FLOOR SEALER WHERE INDICATED. ALL RB BASE TO BE COVED.
B. BRICK BASE (BRK-3): 3 BRICKS HIGH, TO BE INSTALLED AT ALL NEW BRICK WALL LOCATIONS, UNLESS NOTED OTHERWISE.
C. PRECAST EPOXY TERRAZZO BASE, 8"H, TO BE INSTALLED WHERE INDICATED ON FINISH PLANS.

PAINT & STAIN

A. PAINT ALL GWB AND CMU WALLS UNLESS OTHERWISE INDICATED ON FINISH PLANS.
B. DO NOT PAINT NEW OR EXISTING BRICK OR GROUND FACE MASONRY UNITS.

PAINT TYPE GENERAL NOTES

A. UNDER SECTION 099123 - INTERIOR PAINTING, PAINT EXPOSED PIPES, DUCTWORK, BREACHING, CONDUIT, INSULATED PIPES, CONDUIT HANGERS, SUPPORTS, BRACING, ETC., WHICH OCCURS IN SPACES DESIGNATED TO BE PAINTED IN PART OR WHOLE.
B. ALL GYPSUM BOARD WALLS SHALL BE PAINTED WITH INTERIOR PAINT TYPE #9.23 (SEMI-GLOSS) UNLESS OTHERWISE INDICATED.
C. ALL GYPSUM BOARD CEILINGS AND SOFFITS SHALL BE PAINTED WITH PAINT TYPE #9.21 (FLAT) UNLESS OTHERWISE INDICATED.
D. PAINT ALL NON-INTEGRALLY COLORED CMU WALLS WITH INTERIOR PAINT TYPE #4.14 (SEMI-GLOSS), UNLESS OTHERWISE INDICATED.
E. IN THE FOLLOWING ROOMS PAINT WITH PAINT CODE #4.224 (EPOXY-SEMI-GLOSS): **ALL CORRIDORS AND LOCKER ROOMS**. REFER TO SECTION 099600 - HIGH PERFORMANCE COATINGS.
F. IN THE FOLLOWING ROOMS PAINT WITH PAINT CODE #4.225 (ACRYLIC-SEMI-GLOSS): **ALL ROOMS IN POOL ENVIRONMENT, SEE LIST BELOW**. REFER TO SECTION 099600 - HIGH PERFORMANCE COATINGS.
G. IN THE FOLLOWING ROOMS, EXPOSED STEEL (FERROUS) STRUCTURE SHALL BE PAINTED INTERIOR PAINT TYPE #5.11: **CORRIDORS NOT IN POOL ENVIRONMENT**
H. ALL FERROUS METAL (EXCLUDING STRUCTURE) SHALL BE PAINTED INTERIOR PAINT TYPE #5.12.
I. ALL FERROUS METAL (EXCLUDING STUCTURE) PREVIOUSLY PAINTED WITH OIL BASED PAINT SHALL BE PAINTED INTERIOR PAINT TYPE #5.13.
J. ALL STEEL COLUMNS AND BEAMS SHALL BE PAINTED INTERIOR PAINT TYPE #5.222 (EPOXY) UNLESS NOTED OTHERWISE. **DO NOT USE IN POOL ENVIRONMENT**
K. ALL STEEL STAIR STRINGERS AND STAIR ASSEMBLIES SHALL BE PAINTED INTERIOR PAINT TYPE #5.223 (URETHANE) UNLESS NOTED OTHERWISE. **DO NOT USE IN POOL ENVIRONMENT**
L. IN THE FOLLOWING ROOMS, STEEL JOISTS SHALL BE PAINTED INTERIOR PAINT TYPE #5.224: **POOL ENVIRONMENT**
M. IN THE FOLLOWING ROOMS, MISC. STEEL SHALL BE PAINTED INTERIOR PAINT TYPE #5.225: **POOL ENVIRONMENT**
N. IN THE FOLLOWING ROOM, PREVIOUSLY PAINTED STEEL STRUCTURE SHALL BE REPAINTED INTERIOR PAINT TYPE #5.227: **G024 EXISTING NATATORIUM**
O. ALL EXPOSED GALVANIZED-METAL STRUCTURE SHALL BE PAINTED INTERIOR PAINT TYPE #5.31 UNLESS NOTED OTHERWISE. **DO NOT USE IN POOL ENVIRONMENT**
P. ALL GALVANIZED METAL (EXCLUDING STRUCTURE) SHALL BE PAINTED INTERIOR PAINT TYPE #5.32.
Q. ALL ROOF DECK GALVANIZED STEEL SHALL BE PAINTED INTERIOR PAINT TYPE #5.321.
R. IN THE FOLLOWING ROOMS, PAINT GALVANIZED STEEL RAILINGS INTERIOR PAINT TYPE #5.323: **POOL ENVIRONMENT**
S. ALL OTHER GALVANIZED STEEL TO BE INTERIOR PAINT TYPE #5.322
T. ALL PIPE AND DUCT INSULATION SHALL BE PAINTED INTERIOR PAINT TYPE #10.11.
U. ALL ALUMINUM DUCTWORK SHALL BE PAINTED INTERIOR PAINT TYPE #10.12.
V. THE POOL ENVIRONMENT FOR SPECIAL COATINGS, MATERIALS, AND TREATMENTS INCLUDES THE COMPETITION POOL SPACE, POOL DECK, POOL EQUIPMENT ROOM, POOL STORAGE ROOMS, SPECTATOR SEATING AREAS AND ADJACENT SPACES WITHIN THE SPACE ENCLOSURE. ROOM NUMBERS ARE AS FOLLOWS: **N013, N021, N021A, N022, N027, N029, N030, N035, N036, N036A, N036B, N037, N039, N102, N104, N107, N109, N201, N202, N203, N204, G023, G024, G102, AND G103.**

PAINT COLOR GENERAL NOTES

A. ALL INTERIOR WALLS THAT RECEIVE PAINT SHALL BE PAINTED P-1, UNLESS OTHERWISE INDICATED ON FINISH PLANS OR INTERIOR ELEVATIONS.
B. PAINT ALL EXPOSED STEEL ON STAIRS, RAILS, AND STRINGERS P-11.
C. PAINT ALL GWB SOFFITS P-1 UNLESS OTHERWISE NOTED ON FINISH PLANS OR INTERIOR ELEVATIONS.
D. PAINT ALL SIDES (HORIZ. AND VERT.) OF SOFFIT INDICATED COLOR, UNLESS OTHERWISE NOTED.
E. PAINT ALL PAINTED EXPOSED CEILINGS AND GYPSUM BOARD CEILINGS P-1 UNLESS OTHERWISE NOTED ON FINISH PLANS, CEILING PLANS, OR INTERIOR ELEVATIONS.
F. ALL INTERIOR HOLLOW METAL FRAMES AND DOOR FRAMES TO BE PAINTED P-2 UNLESS OTHERWISE NOTED.
G. ALL EXPOSED INTERIOR STEEL COLUMNS SHALL BE PAINTED TO MATCH ADJACENT WALL COLOR, UNLESS OTHERWISE INDICATED ON INTERIOR ELEVATIONS OR FINISH PLANS.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

WILLIAM E. PAYNE
STATE OF INDIANA
No. 4169
STATE OF INDIANA
REGISTERED ARCHITECT

PROJECT MANAGER: CS
DRAWN BY: AML
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

LIST OF FINISHES

A8S.01

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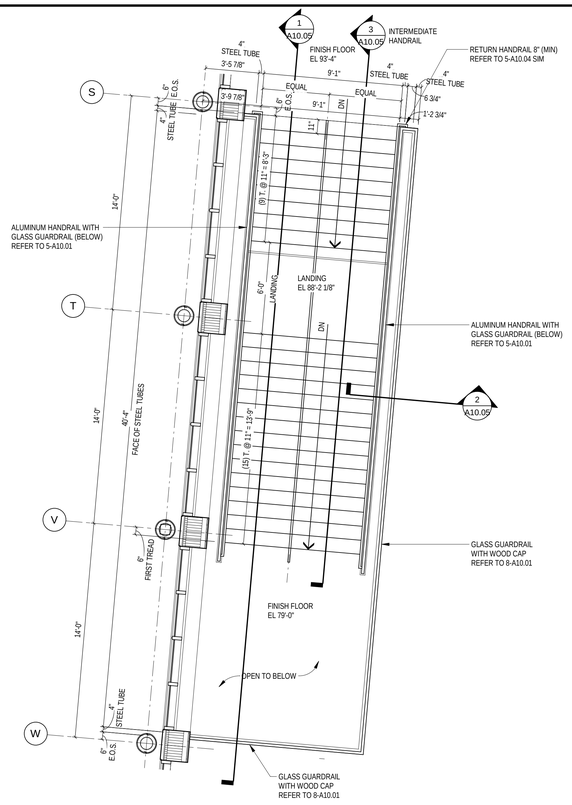
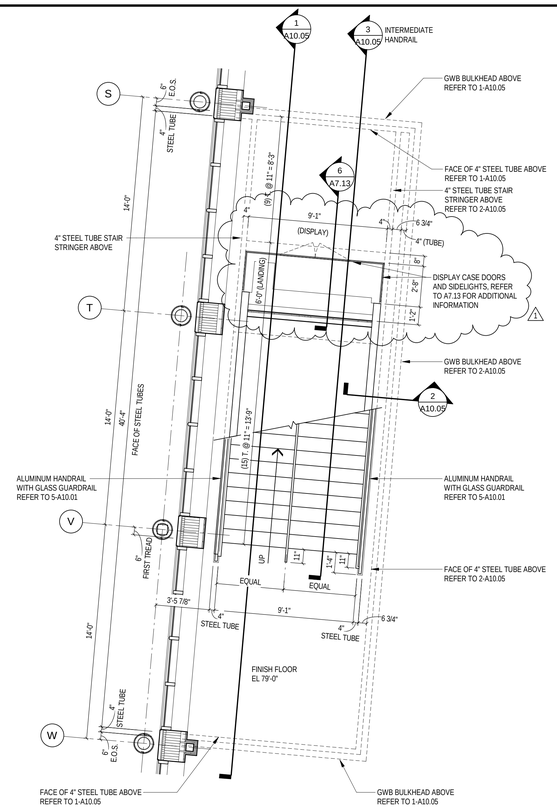


8 PLAN - STAIR (S6) FIRST FLOOR (N1)

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

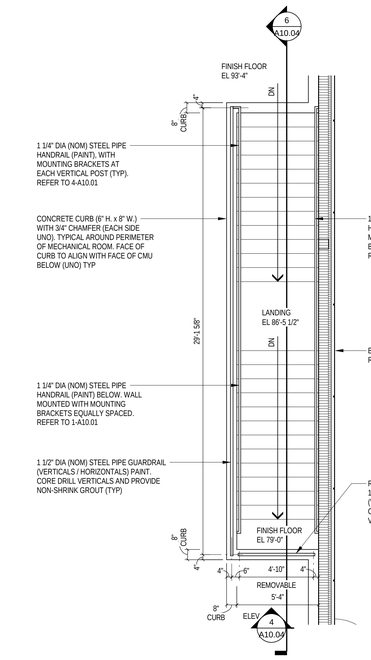


7 PLAN - STAIR (S6) LOWER LEVEL (N1)

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

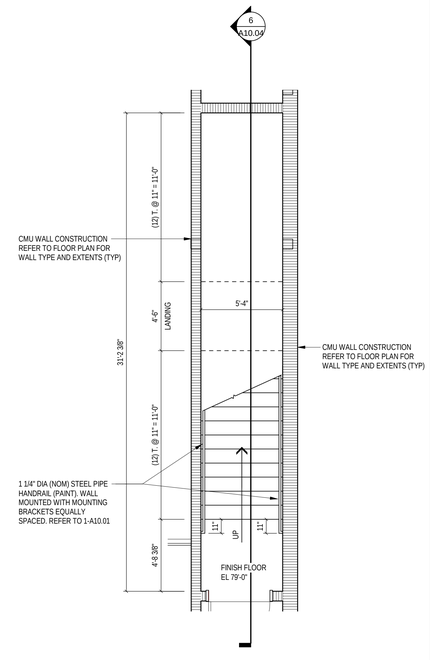
1 NOT USED

N.T.S.



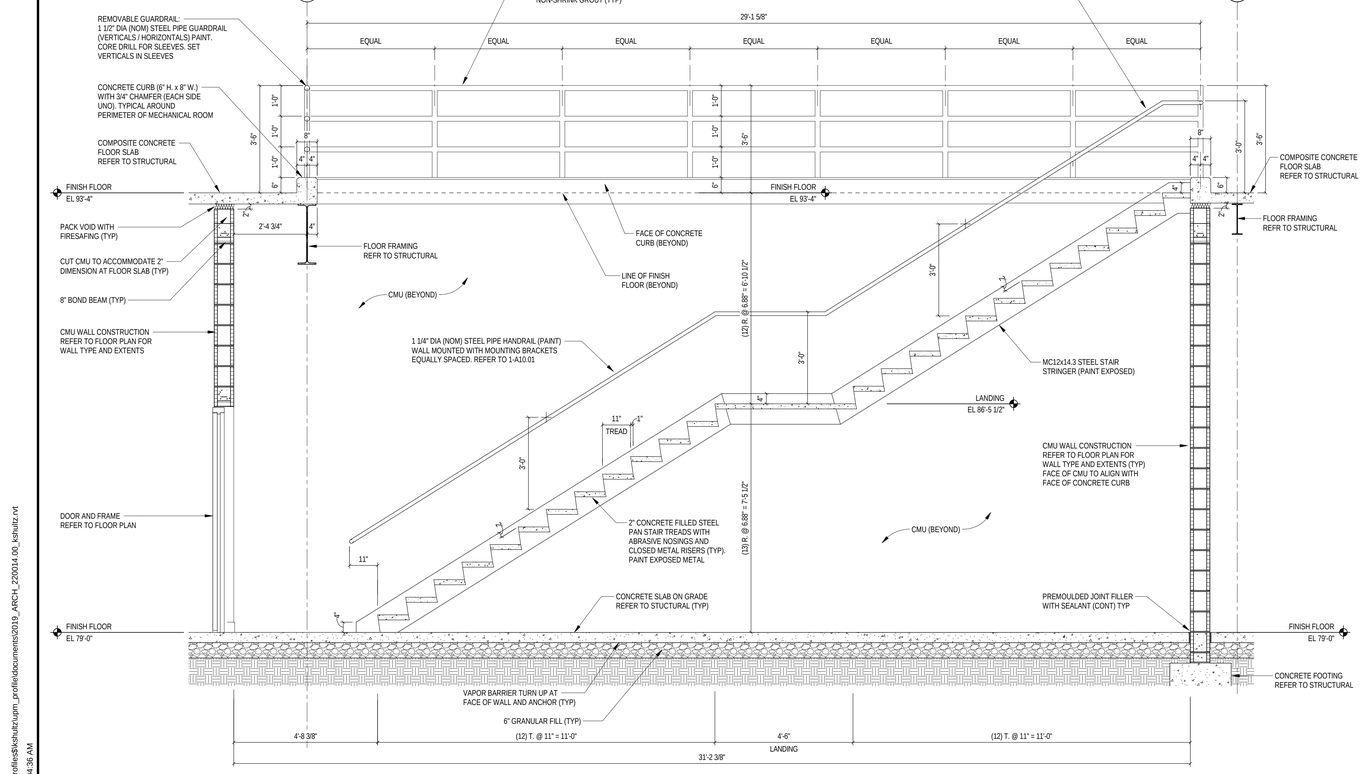
3 PLAN - STAIR (S4) FIRST FLOOR (N2)

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



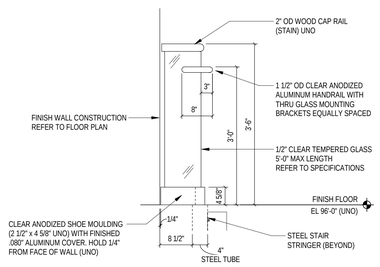
2 PLAN - STAIR (S4) LOWER LEVEL (N2)

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



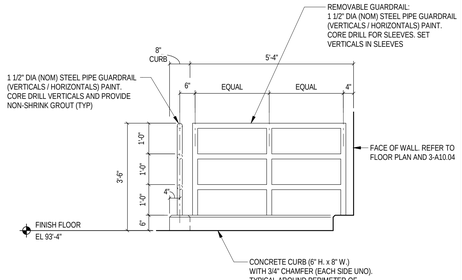
6 SECTION - STAIR (S4)

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



5 ELEVATION - HANDRAIL / GUARDRAIL (STAIR S3)

SCALE: 3/4" = 1'-0"



4 ELEVATION - GUARDRAIL (N110)

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

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

WILLIAM E. PAINE — STATE OF INDIANA — No. 4169 — REGISTERED ARCHITECT

PROJECT MANAGER: CS

DRAWN BY: MDM

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

VERTICAL CIRCULATION

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CARMEL HIGH SCHOOL POOL EQUIPMENT

THIS IS A GENERALIZED LIST OF EQUIPMENT. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION

WARNING SIGNS
ISOMETRIC AND DETAILED INSTRUCTIONS
INSTRUCTIONS FOR OPERATING DRAINING POOLS / SPA
PUMP CURVES
VALVE AND EQUIPMENT TAGS
STARTUP AND FILL INSTRUCTIONS
ALL PIPING TO BE RIGID PVC SCHEDULE 80 NSF APPROVED FOR PORTABLE RIGID WITH MOLDED FITTINGS.
HOUSEKEEPING PADS FOR FILTERS, PUMPS AND HEATERS.
DIRECTIONAL ARROWS ON ALL PIPING
COVER ALL SUMPS WITH FRP GRATING
PIPING MODIFICATIONS IN EXISTING SURGE TANK
WATERPROOF ALL SURGE TANKS
ANY CONDUIT RUNS PENETRATING RETURN AIR TO BE CPVC
THIN SET POOL DECK AND THICK SET POOL BASIN
REPLACE ALL EXISTING VALVES AND EQUIPMENT ON EXISTING POOL

EQUIPMENT SCHEDULE

ITEM	QUANTITY	EQUIPMENT DESCRIPTION
CIRCULATION & DISTRIBUTION EQUIPMENT		
1	78	INLETS 2" ABS FLOOR INLETS STARITE MODEL NO. #08417 WHITE IN COLOR
2	13	SIDE WALL INLETS HAYWARD MODEL NO. SP-1022 1 1/2" WITH SP-1419 DIRECTIONAL INLET FITTINGS
3	10	GUTTER DROP-OUT CONVERTORS STAINLESS STEEL 316L WITH FLANGED CONNECTIONS (6) 8" AT COMPETITION POOL, (2) 6" AT THERAPY POOL, (2) AT DIVING POOL
4	4	SKIMMER
5	29	THERAPY JET INLETS: WARMING
6	QTY	HOT DIPPED GALVANIZED HANGARS AND HARDWARE IN DRY AREAS AND 316L SS IN WETTER AREAS
FILTRATION EQUIPMENT		
7	1	AQUA REVIVAL COMPLETE FILTER SYSTEMS NEW 50M POOL MODEL BSG 50T
8	1	AQUA REVIVAL COMPLETE FILTER SYSTEM EXISTING 50M POOL BSG 40T
9	1	AQUA REVIVAL COMPLETE FILTER SYSTEM DIVING POOL BSG 20T
10	1	AQUA REVIVAL COMPLETE FILTER SYSTEM WARM WATER POOL BSG 20T
11	1	AQUA REVIVAL COMPLETE FILTER SYSTEM THERAPY POOL BSG 20T
FILTER PUMPS, MOTORS AND ELECTRICAL		
12	2	COMPETITION POOL FILTER PUMP AND MOTOR TO BE AURORA 3801, 60HP, 2,556 GPM @ 70' HD, 3 PHASE, 480 VOLTAGE, 60 CYCLE, 1800 RPM, BALL BEARING, BRONZE FITTED, 316 STAINLESS IMPELLER, 316 SS SHAFT SLEEVE, 316 SS SHAFT, INTERNAL SHAFT GROUNDING, DOUBLE VOLUTE FOR 4" DISCHARGE, GAUGE TAPS, 304 SS MOTOR RISER, NSF 50, SCOTCHCOATED 134, WITH PREMIUM EFFICIENCY MOTOR 90 PLUS, TEFC ENCLOSURE, EPDM, LOW STARTING CURRENT, INVENTOR RATED, WITH PUSH BUTTON STATION AND CONTROLS
13	1	EXISTING COMPETITION POOL FILTER PUMP AND MOTOR TO BE AURORA 3801, 50HP, 1,700 GPM @ 75' HD, 3 PHASE, 480 VOLTAGE, 60 CYCLE, 1770 RPM, BALL BEARING, BRONZE FITTED, 316 STAINLESS IMPELLER, 316 SS SHAFT SLEEVE, 316 SS SHAFT, INTERNAL SHAFT GROUNDING, DOUBLE VOLUTE FOR 4" DISCHARGE, GAUGE TAPS, 304 SS MOTOR RISER, NSF 50, SCOTCHCOATED 134, WITH PREMIUM EFFICIENCY MOTOR 90 PLUS, TEFC ENCLOSURE, EPDM, LOW STARTING CURRENT, INVENTOR RATED, WITH PUSH BUTTON STATION AND CONTROLS.
14	6	THERAPY POOL / DIVING POOL / WARM WATER POOL FILTER PUMP AND MOTOR TO BE AURORA 3801, 15HP, 400 GPM @ 70' HD, 3 PHASE, 480 VOLTAGE, 60 CYCLE, 1800 RPM, BALL BEARING, BRONZE FITTED, 316 STAINLESS IMPELLER, 316 SS SHAFT SLEEVE, 316 SS SHAFT, INTERNAL SHAFT GROUNDING, DOUBLE VOLUTE FOR 4" DISCHARGE, GAUGE TAPS, 304 SS MOTOR RISER, NSF 50, SCOTCHCOATED 134, WITH PREMIUM EFFICIENCY MOTOR 90 PLUS, TEFC ENCLOSURE, EPDM, LOW STARTING CURRENT, INVENTOR RATED, WITH PUSH BUTTON STATION AND CONTROLS
15	1	WARM WATER POOL JET PUMP WITH STRAINER, BASKET AND SPARE BASKET EQK 500 WITH TEFC JMZ FRAME 5HP, SELF PRIMING 240 GPM @63'HD 3500 RPM SELF PRIMMING, 3PHASE, 480 VOLTAGE, 60 CYCLE, WITH BALL BEARING, ALL BRONZE, TEFC ENCLOSURE, EPDM, LOW STARTING CURRENT, INVENTOR RATED, WITH PUSH BUTTON STATION AND CONTROLS
16	1	THERAPY POOL JET PUMP WITH STRAINER, BASKET AND SPARE BASKET EQK 500 WITH TEFC JMZ FRAME 5HP, SELF PRIMING 200 GPM @63'HD 3500 RPM SELF PRIMMING, 3PHASE, 480 VOLTAGE, 60 CYCLE, WITH BALL BEARING, ALL BRONZE, TEFC ENCLOSURE, EPDM, LOW STARTING CURRENT, INVENTOR RATED, WITH PUSH BUTTON STATION AND CONTROLS
17	1	WARMING POOL JETS AIR BLOWER ROTON DR404AL72M, 1HP WITH SILENCER
18	18	LIQUID FILLED GAUGES AROUND ALL PUMPS 2 ½" STAINLESS STEEL TRERICE SERIES 700 -15 0 15 VACUUM GAUGES AND 0 TO 60 PRESSURE GAUGES WITH STAINLESS STEEL BOURBON TUBES 316 ALL GAUGES WITH ST.ST. SNUBBERS TUBE, NEEDLE VALVES AND SOCKET.
19	9	FLANGED FLEXIBLE ECCENTRIC DISCHARGE CONNECTIONS
20	4	24' X 24" ANTI VORTEX PLATE IN BALANCE TANK
21	3	CUSTOM ELECTRIC PANELS WITH ALL CONTROLS – THESE ARE SEPARATE FROM FILTER CONTROL PANELS WITH (2) IN THE NEW FILTER ROOM AND (1) IN THE EXISTING FILTER ROOM
22	10	FLUIDTROL FRP/PVC CONCENTRIC AND ECCENTRIC REDUCERS
23	9	CHAMPION DOUBLE DOOR EPOXY COATED DUCTILE IRON CHECK VALVES WITH ST. ST. SPRINGS, PLAIN FACE, EPDM SEAT, SERIES 125
24	4	FLUIDTROL OR NEPTUNE PVC DIVERSION VALVES, SCH. 80 PVC WITH VANSTONE FLANGES, INTERNAL WAFER T304L, 1" DIA. FLOAT ARM, FASTENED TO SHAFT WITH T 316SS NUTS AND WASHER, (2) 1/2" DIA. ARMS ALL THREADED ROD T316 SS, (2) T304L ST. ST. FLOATS 7"
25	7	FLUIDTROL SW SERIES STRAINERS WITH 1/8" OPENNINGS, ST. ST. BASKETS AND SPARE BASKETS FOR EACH.
26	QTY	GEORGE FISHER TYPE 563 VALVES. VALVES IN BALANCE TANK TO HAVE ST ST VALVE EXTENSIONS, ST ST SLEEVES, VALVES OVER 5' TO HAVE CHAIN OPERATORS, VALVES OVER 3" TO HAVE GEAR OPERATORS. VALVES SMALLER THAN 3" SHALL BE BALL VALVES.
27	QTY	PVC TRUE UNION BALL VALVES SMALLER THAN 3"
28	4	ALUMINIUM DOORS TO BE BILCO (3) 3' X 3' AND (1) 18" X 18 WITH TILE INLAY FOR INSPECTION SUMP
29	QTY	NDS MINI CHANNEL DECK DRAIN WITH 100% SILICONE SEALANT AT THE EDGES OF TRENCH DRAIN
SUPPORT SYSTEMS DESCRIPTIONS		
30	2	DROP IN PUMP FOR NEW INSPECTION SUMP AND FOR EXISTING PUMP PIT 110V/1/2HP 1PH
31	2	MARLOW 1.5 HP, 60-75 GPM DECK DRAIN/ OVERFLOW SUMP PUMPS 480V/3 PHASE WITH FLOATS AND NEMA 4X CONTROL PANEL
32	5	FLOW METERS SIGNET 2551 MAGMETER WITH 8550 FLOW INSTRUMENT WIRED INTO CONTROLLERS FOR FILTER VFD CONTROL.
33	3	AUTOMATIC WATER LEVEL CONTROLLER CLA VAL NO 124-01 1" WITH ST ST BODY, ST ST FLOATS AND ST ST RODS, STILLING CHAMBER, X46 STRAINER, CK2 COCK, SPEED CONTROL, Y STRAINER, AND 3" FRESH WATER MANUAL FILL AND TRAINING POOL FROM COMPETITION POOL.
34	2	DIRECT SENSING AUTO FILL LIQUID LEVEL 6200 SERIES WITH STATIC LINES
35	2	3" FRESH WATER FILL AND 1 1/2" FILLS AND 1" WATTS #900 FOR WARM POOL FILL AND CONNECTION FROM DIVING POOL TO FILL WARM WATER POOL
36	9	DALDORADO 18" X 36" X 24" UNLOCKABLE DRAIN BOXES WITH RELIEF VALVES IN EACH BOX.
37	3	CONNECTIONS WITH 4" PVC TJERLUND FANS 115V
38	4	PROMINENT CHEMICAL CONTROLLERS DCM 512 WITH FLOW SWITCH, VFD CONTROL, REAL TIME CORROSION AND CALCIFICATION AND ALARM. PLUS UPGRATE TO EXISTING CONTROLLER
39	5	ACCUTAB MODEL 3070AT FOR COMPETITION POOLS AND MODEL 1030 FOR THERAPY POOL, WARM WATER POOL AND DIVING POOL.
40	5	ACID RITE 2500 FEEDER FOR COMPETITION POOLS AND ACID RITE 450 FOR THERAPY, WARM WATER AND DIVING POOLS
41	1	ULTRA SPILL PALETS PART NO. 1113, 53 X 53 X 11 1/4" VERIFY ON SITE
42	QTY	PROTECTIVE GOGGLES, PVC GLOVES AND MASK.
43	QTY	SIGNS FOR ACID, CHLORINE, ENZYME AND INSTRUCTIONS
44	15	THERMOMETERS TRERICE ST ST ADJUSTABLE WITH WELLS
45	1	TEST KIT TAYLOR SERIES K-1741C ADDITIONAL SET FOR TESTING TO 50 PPM
46	1	PORTABLE VACUUM PUMP SYSTEM AND (2) DOLPHIN AUTOMATIC CLEANERS
47	16	FIBERGLASS HOOKS
48	QTY	STAINLESS STEEL HANDRAILS AND CUSTOM RAILS FOR RAMP WITH HANDICAP RETURNS – POWDER COATED
49	11	SETS OF GRAB RAILS 316 L STAINLESS STEEL 1.5O.D., ,145 WALL WITH ST ST ESCUTEONS AND ANCHORS – POWDER COATED
50	12	8" PENTAIR 8' U BEND 2 POST STANCHION POSTS 1.90 X 14S T316L ST. ST. POWDER COATED PART NO S1229683 WITH 6" DEEP ST. ST. ANCHORS AND DROP IN COVERS.
51	24	POWDER COATED 316L ST.ST. GRAB RAILS AND CUSTOM HANDRAILS WITH CUSTOM RAMP RAILS. ANCHORS SHALL BE BRONZE WITH ST. ST. ESCUTCHEONS.
52	QTY	DURA TEECH HDPE PARALEL POLY GRATING WITH ANGLES.
53	48	STARTING PLATFORMS SR SMITH 24" X 32" LONG REACH - NEW 50M COMPETITION POOL (32 REQ'D.) & STANDARD REACH - EXISTING 50M COMPETITION POOL (16 REQ'D.) WITH WEDGE, SIDE STEP, ST. ST. ANCHORS, BACKSTROKE, GRAB RAILS, FOOT, CHOCKS AND ALL NEW ANCHORS
54	10	REPLACE EXISTING ANCHORS IN EXISTING POOL AND CUSTOM MAKE ANCHORS FOR EXISTING BUKLKHEADS
55	QTY	WAVE QUELLING RACING LANE FOR 50M, 25M, 25Y MARKER LINES INCLUDING COMPETITOR WITH HARDWARE WITH ANCHORS
56	16	BACKSTROKE MARKER WITH STAINLESS STEEL ANCHORS, FLAGS WITH TEAM NAME.
57	QTY	PLASTIC COATED STAINLESS STEEL CABLE ACROSS, BACKSTROKE PENNANT LINE 12" X 18" WITH ALTERNATING COLORS AND INDIVIDUAL NUMBERS AND LETTERS FOR TEAM NAME. REC #92-306 AND 92-307. INSTALL WITH ANTI SUPERTENSIONERS.
58	2	4' FIBERGLASS MOVABLE BULKHEADS WITH STAINLESS STEEL PIN RAILS AND PLATFORM ANCHORS
59	3	3' X 3' NYSTROM FGA SERIES LOCKABLE DOORS WITH ST. ST. HARDWARE FOR BALANCE TANKS AND 18" X 18" TO COVER DEWATERING MANHOLE WITH TILE INLAY.
60	28	PS2 PFS COPOLYMER RUNGS FOR BALANCE TANKS SET 12" CR
61	2	PUMP PIT RAILS BY DIV. 05.
62	1	FIBERGLASS FLOOR SUMP WITH GRATE COVER AND (2) 1HP SUMP PUMPS AND CONTROLS
63	1	TALL LIFEGUARD CHAIR WITH SIDE STEP WITH A PLATFORM HEIGHT OF 47" AND A SEAT HEIGHT OF 64" INCLUDES UMBRELLA GUIDE AND CUP HOLDER. RECREONICS.MODEL NO. 42-626.
64	QTY	FURNISH SPECTATOR STANCHIONS WITH INTERMEDIATE CHAIN. MR CHAIN HEAVY-DUTY MODEL STANCHIONS SHALL BE SUBSTANTIAL ROUND POSTS WITH A 32" OVERALL HEIGHT AND 2" IN DIAMETER.
65	AS REQ'D.	SUMPS GRATING
66	1	18" LONG POOL BRUSH REC#10-135 WITH NYLON BRISTLES AND RIGID BACK AND HOLDER SHALL BE PERMANENTLY ATTACHED. HOLDER BRACKET SHALL BE OF CAST AL AND SHALL BE DESIGNED FOR EASY ATTACHEMENT TO STANDARD 1 ¼" AL HANDLE.
67	1	LEAF SKIMMERS 20" X 6" X 12" DEPTH. REC# 10-118
68	1	WHITE RING BUOY 24' DIAMETER WITH 90' OF3/" THROW ROPE ATTACHED REC#12-252
69	4	RESCUE TUBES MADE OF CLOSED CELL ENSOLITE WITH HEAVY DUTY ORANGE VINYL SKIN, QUICK RELEASE BUCKEL AND 6' TOW LINE REC# 12-291
70	1	12' FIBERGLASS SAFETY POLE WITH BLUNT ENDS AND SHEPARD HOOK REC# 10-371 AND 12-239 .
71	1	FIRST AID KIT ARC APPROVED REC#12-048, BLOOD SPILLS KIT REC#12-041, WHISTLE REC#12-357
72	2	RESUSCITATION MASKS
73	1	BLOOD BORNE PATHOGENS KIT WITH GOWN, FACE MASK, SHIELDS, BODY FLUID CLEAN UP REC#12-041
74	2	POOL SPLASH LIFT BATTER POWERED WITH SPARE BATTERY AND CHARGER WITH FOOTREST,ARM REST, SPINE BOARD ATTACHMEN AND SEAT BELT. LIFE ANCHORS FOR OWNER'S LIFT.
75	2	PORTABLE PACE CLOCKS.
76	2	CJ SPINEBOARD 76" X 20" WITH NYLON STRAPS, HEAD IMMOBILIZER, BODY STRAPS, HEAD STRAPS, ADHESIVE STRIPS AND STAPLES REC#12-325
77	4	PROMINENT MEDIUM PRESSURE UV UNIT
78	2	HAWS EYEWASH SHOWER MODEL 8336 EPOXY COATED, CORROSION RESISTANT
79	4	STAINLESS STEEL DOUBLE WALL HEAT EXCHANGERS
80	3	DURAFIRM ONE METER DIVE STANDS WITH 16'-0" MAXIFLEX B BOARDS
81	3	DURAFIRM ONE METER DIVE STANDS WITH DIVE SPRAYS
82	1	CUSTOM FRP DESK IN FILTER ROOM WITH SHELF AND CUSTOM STORAGE SHELVING
83	5	CO2 SYSTEM
84	QTY	CUSTOM PUMP PIT STAIRS. CUSTOM DOUBLE RAIL AROUND PUMP PIT WITH CHAIN RAILS BY DIV. 05.
85	1	FLOOR DRAIN, SEE MECHANICAL DWGS, BY OTHER THAN AQUATIC CONTRACTOR
86	2	HOSE BIB, SEE MECHANICAL DWGS, BY OTHER THAN AQUATIC CONTRACTOR
87	16	LED UNDERWATER POOL LIGHT NICHE FURNISHED BY POOL CONTRACTOR WITH 3' OF 1" DIA. OF SCH 80 PVC AND #8 BOND WIRE. LED LIGHTS FURNISHED BY POOL CONTRACTOR LED LIGHTS INSTALLED BY DIV. 26.
88	4	UNDERWATER SPEAKERS AND SPEAKERS NICHE BY DIV. 26. POOL CONTRACTOR SHALL INSTALL SPEAKER NICHE WITH 3' OF 1" DIA. OF SCH 80 PVC AND #8 BOND WIRE. SPEAKERS SHALL BE INSTALLED BY DIV. 26.
89	QTY	ADA TRANSFER BARS

SWIMMING POOLS DATA SCHEDULE

ITEM	COMPETITION POOL	DIVING POOL	THERAPY POOL	WARMING POOL	EXISTING COMPETITION POOL
WATER VOLUME	920,000 GALLONS	144,000 GALLONS	24,150 GALLONS	6,746 GALLONS	612,000 GALLONS
WATER SURFACE AREA	14,163 SF	1,490 SF	1.034 SF	325 SF	12,940 S.F.
PERIMETER GUTTER	510 LF (INSIDE GUTTER)	172 LF (INSIDE GUTTER)	139 LF (INSIDE GUTTER)	86 LF (INSIDE WALL)	495'-0"
TURNOVER: MIN. **TURNOVER: ACTUAL**	6 HOURS (360 MINUTES) 6.0 HRS	12 HOURS (720 MINUTES) 6.0 HRS	6 HOURS (360 MINUTES) 1.03 HOUS (62 MINUTES)	.5 HOURS (30 MINUTES) .28 HOUS (17 MINUTES)	6 HOURS (360 MINUTES) 6.0 HRS
TURNOVER FLOW RATE	2556 GPM	400 GPM	400 GPM	400 GPM	1,700 GPM
RETURN INLETS	(60) FLOOR INLETS: ADJ. 2" DIA.	(9) FLOOR INLETS: ADJ. 2" DIA. (2) WALL INLETS (STEPS)	(9) FLOOR INLETS: ADJ. 2" DIA. (1) WALL INLET (STEP)	(10) WALL INLETS:	GUTTER: (198) 3/8"
MAIN DRAINS: 18x36"x24" VGB W/ BODIED SUMP DRAINS W/ FLAT COVER 54% OPEN AREA = 2800 GPM FL.	(4 M.D.) V = 0.54 FT/SEC	(2 M.D.) V = 0.54 FT/SEC	(2 M.D.) V = 0.54 FT/SEC	(2 M.D.) V = 0.54 FT/SEC	(4 M.D.) V = 0.54 FT/SEC
WATER SUPPLY	PUBLIC 3"	PUBLIC 1 1/2"	PUBLIC 1 1/2"	PUBLIC 1 1/2"	PUBLIC 4"
SURGE CAPACITY					13,500 GAL
REQUIRED (EFFECTIVE)	14,163 GAL.	1,490 GAL.	1,034 GAL	NA	EXISTING
SURGE TANK **GUTTER**	9,760 GAL. TANK 7,210 GAL GUTTER	5,019 GAL. TANK 860 GAL GUTTER	5,030 GAL TANK 692 GAL. GUTTER	NA	EXISTING
TOTAL EFFECTIVE	16,970 GAL	5,879 GAL	5,722 GAL.	NA	EXISTING
FILTER TYPE	REGENERATIVE MEDIA FILTER	REGENERATIVE MEDIA FILTER	REGENERATIVE MEDIA FILTER	REGENERATIVE MEDIA FILTER	REGENERATIVE MEDIA FILTER
FILTER AREA	BSG50T = 1,488 SF	BSG20T = 200 SF	BSG20T = 200 SF	BSG20T = 200 SF	BSG40T = 940 SF
FILTRATION RATE	2,556 GPM / 1,488 S.F. = 1.7 GPM / SF	400 GPM/ 200 SF = 2.0 GPM / SF	400 GPM/ 200 SF = 2.0 GPM / SF	400 GPM/ 200 SF = 2.0 GPM / SF	1,700 GPM/ 940 SF = 1.8 GPM / SF
FILTER PIPING **- MAIN DRAIN** **- GUTTER DRAIN**	MAIN DRAIN: 16" GUTTER DROP OUT: 16"	MAIN DRAIN:6" GUTTER DROP OUT: 6"	MAIN DRAIN: 8" GUTTER DROP OUT: 8"	MAIN DRAIN: 8" SKIMMERS: 6"	MAIN DRAIN: 12" GUTTER DROP OUT:(2) 8"
- RETURN	10" FILTER RETURN	6" FILTER RETURN	6" FILTER RETURN	6" FILTER RETURN	10" FILTER RETURN
JETS **- MAIN DRAIN**	NA	NA	JET PUMP SUCTION: 6 - 200 GPM	JET PUMP SUCTION: 6" - 240 GPM	NA
- RETURN	NA	NA	JETS SUPPLY: 3"	JETS SUPPLY: 4"	NA
- INLETS	NA	NA	JETS (10)	JETS (17)	NA
SANITATION SYSTEM	CALCIUM HYPOCHLORITE	CALCIUM HYPOCHLORITE	CALCIUM HYPOCHLORITE	CALCIUM HYPOCHLORITE	CALCIUM HYPOCHLORITE
PH MODIFICATION	SODIUM BISULFATE CO2	SODIUM BISULFATE CO2	SODIUM BISULFATE CO2	SODIUM BISULFATE CO2	SODIUM BISULFATE CO2
SECONDARY SANITATION - CHLORAMINE DESTRUCT	ULTRA VIOLET SYSTEM	ULTRA VIOLET SYSTEM	ULTRA VIOLET SYSTEM	NA	ULTRA-VIOLET SYSTEM

AQUATIC DRAWINGS - INDEX

PL0.0	POOLS DATA, EQUIPMENT LIST & SHEET INDEX
PL1.0	SWIMMING POOLS COMPOSITE PLAN
PL1.1	SWIMMING POOLS COMPOSITE PIPING PLANS
PL2.0	COMPETITION POOL PLAN & SECTIONS
PL3.0	DIVING POOL PLAN & SECTIONS
PL4.0	THERAPY / WARMING POOLS PLAN & SECTIONS
PL5.0	ENLARGED POOL MECHANICAL ROOM PLAN
PL6.0	PIPING ISOMETRIC - COMPETITION POOL
PL6.1	PIPING ISOMETRIC - DIVING POOL
PL6.2	PIPING ISOMETRIC - THERAPY POOL
PL6.3	PIPING ISOMETRIC - WARMING POOL
PL7.0	COMPETITION POOL - TIMING SYSTEM LAYOUT & DETAILS
PL7.1	TIMING SYSTEM DETAILS
PL7.2	TIMING SYSTEM DETAILS
PL8.0	BULKHEAD DETAILS
PL8.1	BULKHEAD DETAILS
PL9.0	DETAILS
PL10.0	DETAILS
PL11.0	DETAILS
PL12.0	DETAILS
PL13.0	DETAILS
PL14.0	DETAILS
PL15.0	DETAILS
PLE1.0	EXISTING SWIMMING POOL PLAN
PLE2.0	EXISTING SWIMMING POOL SECTIONS & DETAILS
PLE3.0	EXISTING ENLARGED SWIMMING POOL MECHANICAL ROOM
PLE4.0	PIPING ISOMETRIC - EXISTING COMPETITION POOL

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

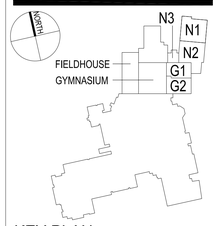
ARCHITECT

FANNING HOWEY

317.848.0966 WWW.FHAI.COM

350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

BILL ROBERTSON POOL DESIGN
613 WHITEGATE
Northville, Michigan 48167
Phone (248) 348-4960
Fax (248) 348-4968



KEY PLAN

CONSTRUCTION DOCUMENTS

PROJECT MANAGER: WJR
DRAWN BY: WJR
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV NO.	DESCRIPTION	DATE
1	ADDENDUM NO.1	01.25.2022

UNIT N1 & N2 - LOWER LEVEL

POOLS DATA, EQUIPMENT LIST & SHEET INDEX

PL0.0

PLOTTED BY: REX OSBORN PLOTTED: Monday, January 24, 2022 8:43:17 PM LOCATION: C:\AA-PROJECTS\CLTN\CLTN2021_BIM Central\Central 4\CLTN_PL_ADDR1_v2x2022.rvt SHEET MDS: ARCH.01 PLOT STYLE: HPGL PRINCIPAL

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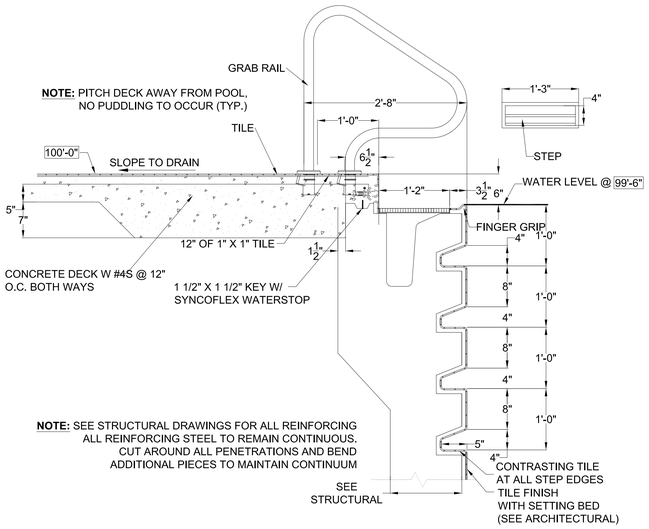
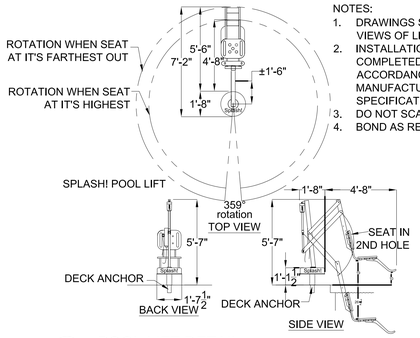
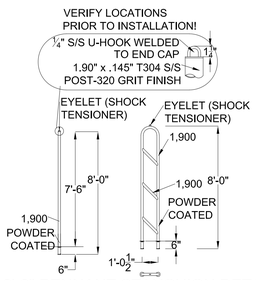


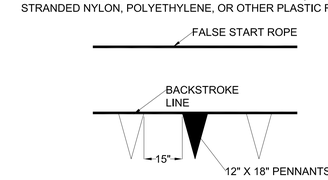
8 IN-WALL STEPS DETAIL
Scale: 1" = 1'-0"



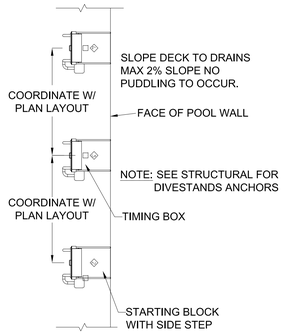
6 POOL LIFT DETAIL
Scale: 1/4" = 1'-0"

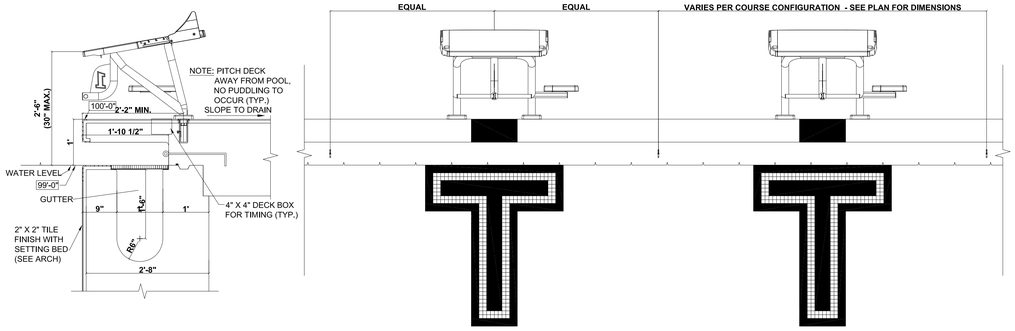


4 8'-0" PENNANT STANCHION DETAIL
No Scale



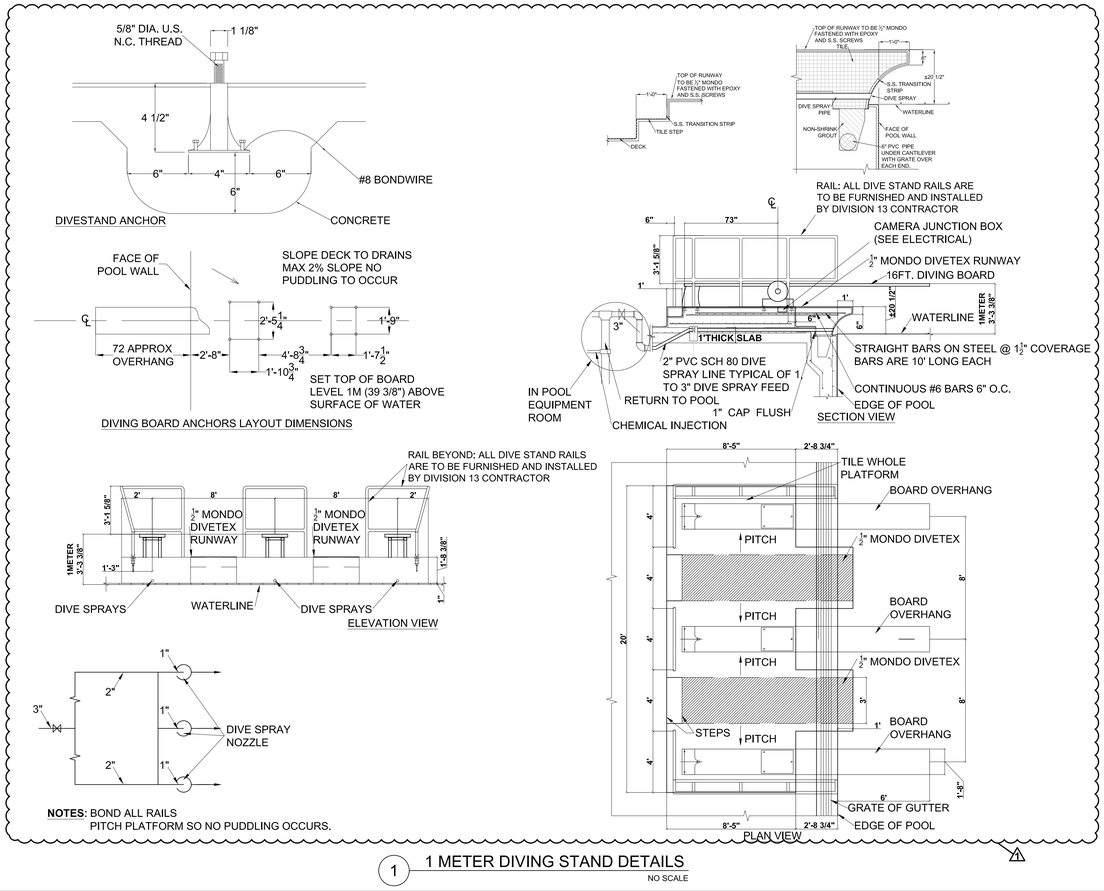
3 PENNANT LINES AND ROPE DETAIL
No Scale





NOTE: THIS STARTING PLATFORM MEETS FINA CODE FR 2.5, USS CODE 103.11.1-6, & NCAA ARTICLE 7.

2 START PLATFORM WITH SIDE STEP DETAILS
No Scale



NOTES: BOND ALL RAILS
PITCH PLATFORM SO NO PUDDLING OCCURS.

1 1 METER DIVING STAND DETAILS
NO SCALE

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

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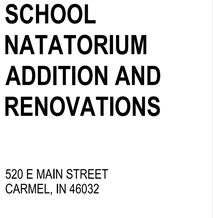
813 WHITEGATE Phone (248) 348-4960
Northville, Michigan 48167 Fax (248) 348-4968

KEY PLAN



CONSTRUCTION DOCUMENTS

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DRAWN BY: WJR
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM NO.1	01.25.2022

UNIT N1 & N2 - LOWER LEVEL

DETAILS

PL9.0

PLOTTED BY: RICK.OSBORN PLOTTED: Monday, January 24, 2022 3:56:13 PM LOCATION: G:\A-PROJECTS\ACTIVE_BR-Carmel\DWG\ARCH\PDS_PL9.0.PLSTA.1.0.PLTA.1.0_Details_ADDM_1.0-2022.dwg PLOT STYLE: ARCH_SPRING.CTB ARCH E1 SHEET SIZE:

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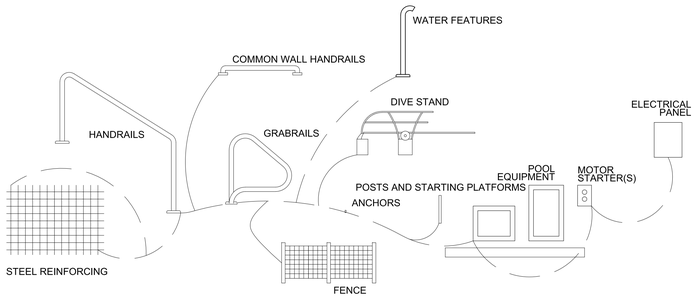
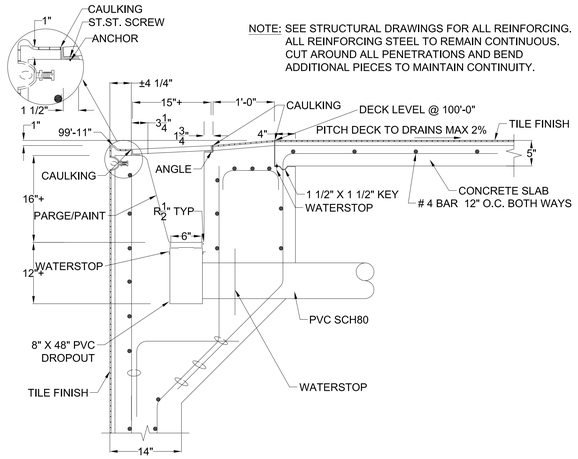


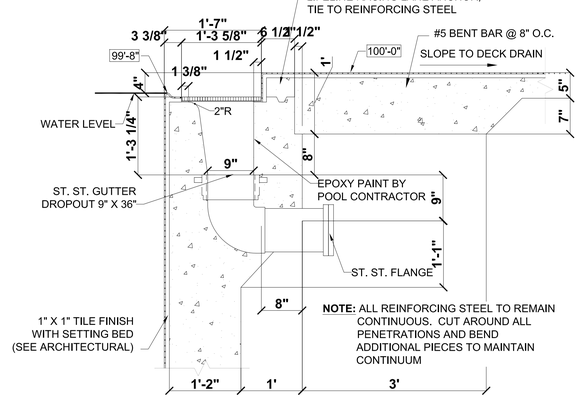
NOTE: BOND POOL EQUIPMENT AND APPURTENANCES WITH #8 AND APPURTENANCES WITH #8 SOLID COPPER WIRE CONDUCTOR TO THE GROUND IN THE ELECTRICAL PANEL. BOND ALL METAL OBJECTS WITHIN 5 FT. OF POOL ELECTRICAL TO COMPLY WITH ART. 680 OF CURRENT N.E.C. REQUIREMENTS. PROVIDE GFI'S IN ALL CIRCUITS SERVING ADAPTORS OR OTHER EQUIPMENT WITHIN 5FT. OF POOL.

10 ELECTRICAL BONDING SCHEMATIC - BY E.C.
SCALE: NO SCALE

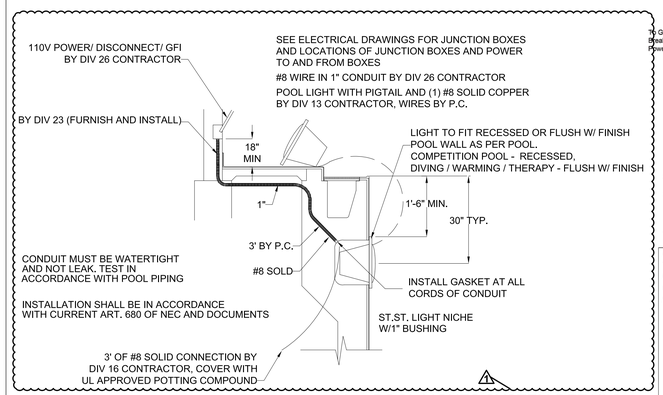


7 DIVING POOL / THERAPY POOL GUTTER DETAIL
SCALE: 1" = 1'-0"

NOTE: PITCH DECK AWAY FROM POOL, NO PUDDLING TO OCCUR (TYP.)



3 TYPICAL GUTTER DETAIL
SCALE: 1" = 1'-0"



9 POOL LIGHTS SYSTEM DETAILS
NO SCALE

INSTALLING THE INTELLIBRITE® 5G POOL LIGHT FIXTURE (AFTER ELECTRICAL REQUIREMENTS ARE MET)

To install the IntelliBrite® Pool Light fixture:

1. Route light cable through conduit to Junction Box, leaving at least four (4) feet of cable at the light fixture to coil around the light (this allows the light to be serviced after the pool is filled with water). See Figure 1 below.

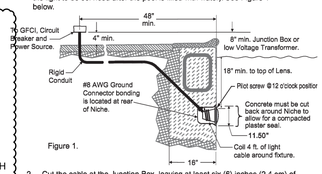


Figure 1.

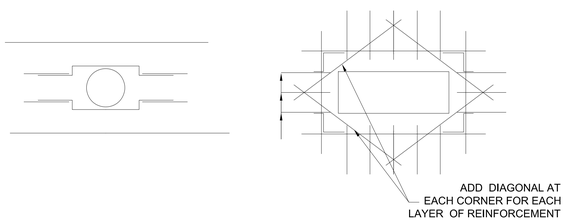
2. Cut the cable at the Junction Box, leaving at least six (6) inches (2.4 cm) of cord to make connections.
3. Strip back six (6) inches (2.4 cm) of the outer cord jacket to expose the three insulated conductors (be careful not to damage the insulation on the three (3) inner conductors). Strip a 1/2" of insulation off the three conductors. Be careful not to damage the copper conductor.
4. Connect all three (3) conductors to the corresponding circuit wires in the Junction Box and secure the Junction Box cover in place.

FOR LIGHT OPERATION, ONLY USE A SAFETY ISOLATION TRANSFORMER.

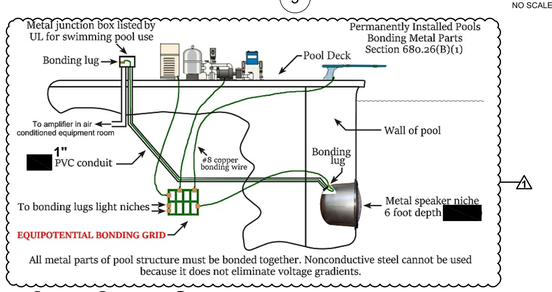
Note: Connect three wires (or two wires) to the corresponding circuit wires in the Junction Box. For three wires connect: Black wire to power, white wire to common, and green wire to ground.

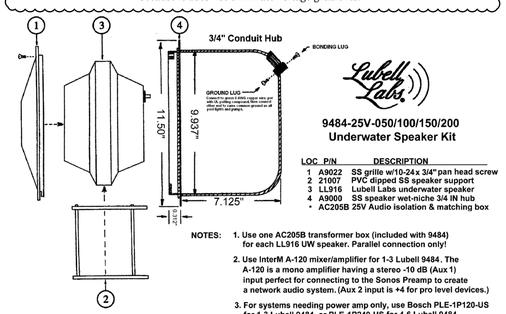


NOTE: FOR 120 VAC ILLUMINARIES, ISOLATION TRANSFORMER IS INCLUDED IN LIGHT FIXTURE.



6 CONCRETE REINFORCING AT OPENINGS DETAIL
NO SCALE



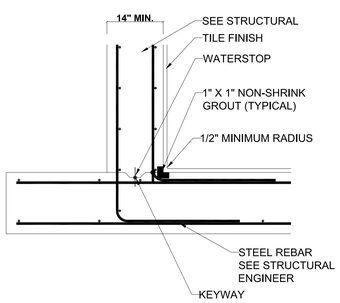


9484-25V-050/100/150/200
Underwater Speaker Kit

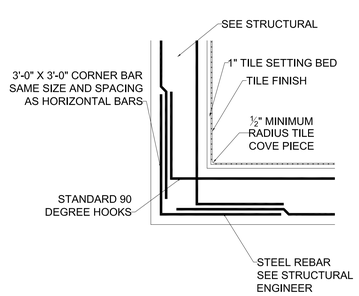
LOC	P/N	DESCRIPTION
1	A9022	SS grille w/10-24 x 3/4" pan head screw
2	21007	PVC dipped SS speaker support
3	LL916	Lubell Labs underwater speaker
4	A9000	SS speaker wet-niche 3/4 IN hub
*	AC205B	25V Audio isolation & matching box

NOTES:
1. Use one AC205B transformer box (included with 9484) for each LL916 UW speaker. Parallel connection only!
2. Use InterM A-120 mixer/amplifier for 1-3 Lubell 9484. The A-120 is a mono amplifier having a stereo -10 dB (Aux 1) input perfect for connecting to the Sonos Preamp to create a network audio system. (Aux 2 input is +4 for pro level devices.)
3. For systems needing power amp only, use Bosch PLE-1P120-US for 1-3 Lubell 9484, or PLE-1P240-US for 4-6 Lubell 9484.

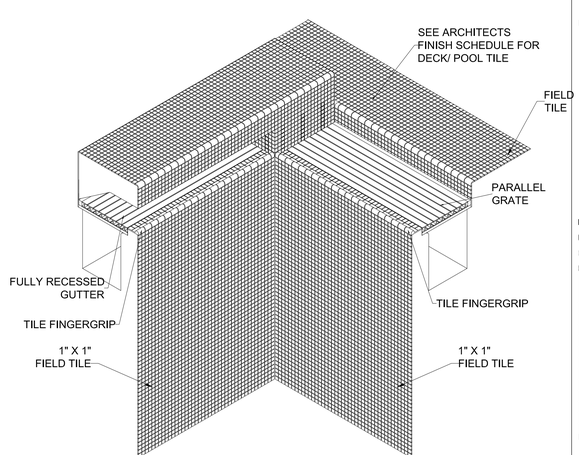
8 SPEAKER SYSTEM DETAILS
NO SCALE



5 WALL AT FLOOR JOINT(TYP.)
NO SCALE



4 REINFORCING AT CORNER
NO SCALE



1 POOL CORNER DETAIL AT GUTTER
NO SCALE

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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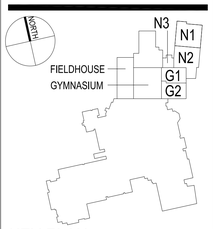
350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

BILL ROBERTSON POOL DESIGN
913 WHITEGATE Phone (248) 348-4960
Northville, Michigan 48167 Fax (248) 348-4968



KEY PLAN

CONSTRUCTION DOCUMENTS

PROJECT MANAGER: WJR
DRAWN BY: WJR
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

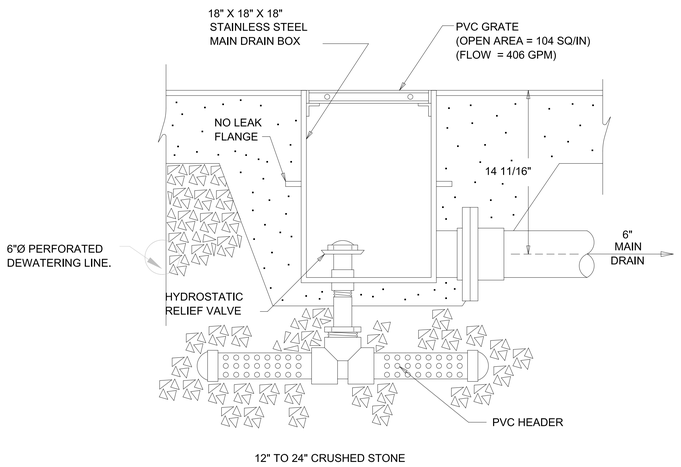
REV. NO.	DESCRIPTION	DATE
1	ADDENDUM NO.1	01.25.2022

UNIT N1 & N2 - LOWER LEVEL

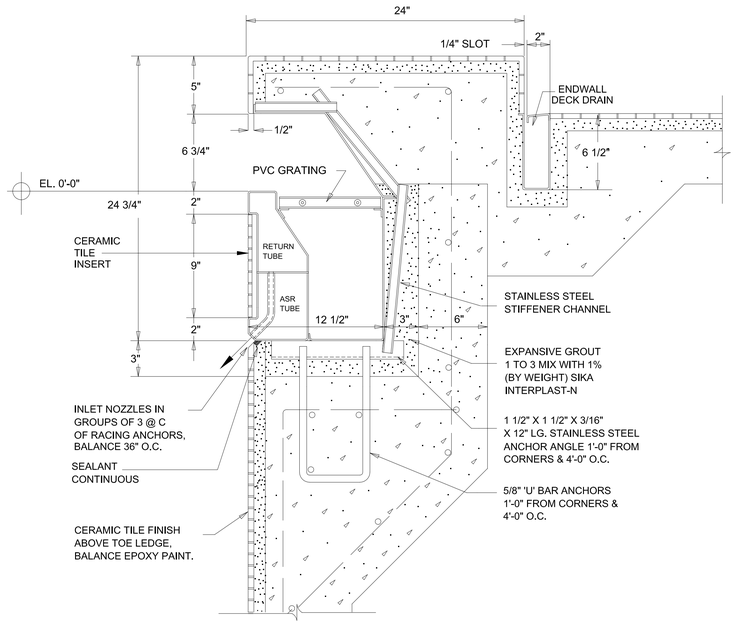
DETAILS

PL11.0

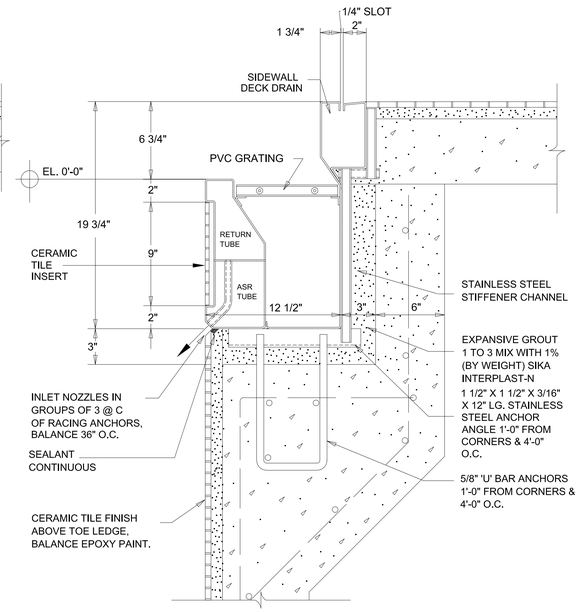
PLOTTED BY: BOB OSBORN
PLOTTED: Monday, January 24, 2022 7:39:49 PM
LOCATION: G:\ARCH\2021\ACTIVE_BR\Cmel\Cmel-PATCH_PL\PL11\PL11.DWG, ARCH E1
PLOT STYLE: HPGL_FHPMid.CTB
SHEET SIZE:
XREF:



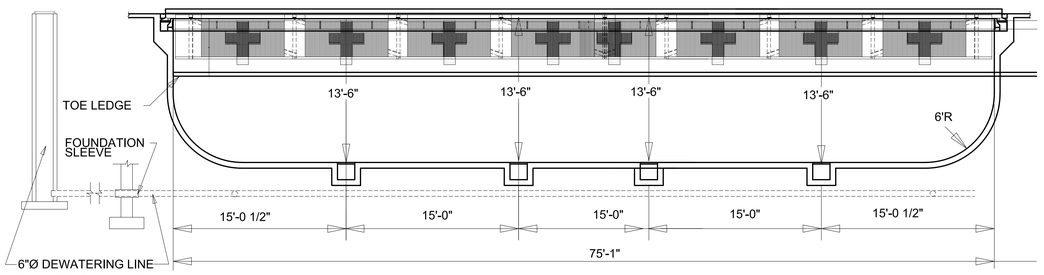
E STAINLESS STEEL MAIN DRAIN
PADDOCK NO. 8818-SS Scale: As Noted



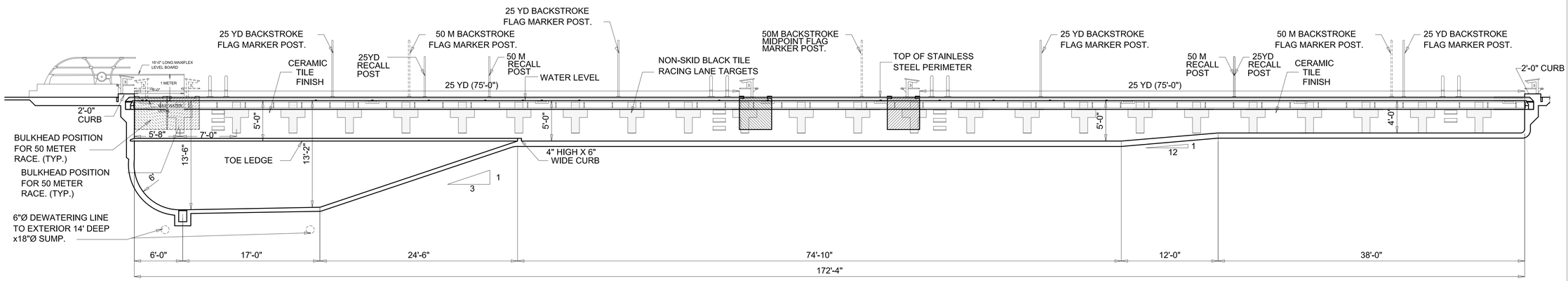
D FULLY-RECESSED END WALL SECTION
LOW CARBON TYPE 304 STAINLESS STEEL Scale: As Noted
IFRS-ASR SYSTEM WITH INTEGRAL DECK DRAIN



C SEMI-RECESSED SIDE WALL SECTION
LOW CARBON TYPE 304 STAINLESS STEEL Scale: As Noted
IFRS-ASR SYSTEM WITH INTEGRAL DECK DRAIN



B EXISTING SWIMMING POOL TRANSVERSE SECTION
Scale: As Noted



NOTE: EXISTING CONDITIONS.
FOR REFERENCE ONLY

A EXISTING SWIMMING POOL LONGITUDINAL SECTION
Scale: As Noted

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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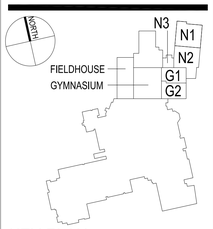

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REV. NO.	DESCRIPTION	DATE
1	ADDENDUM NO.1	01.25.2022

UNIT N1 & N2 - LOWER LEVEL

EXISTING SWIMMING POOL
SECTIONS & DETAILS

PLE2.0

PLOTTED BY: BEN OSBORN
PLOTTED: Monday, January 24, 2022 3:49:57 PM
LOCATION: D:\AP\PROJECTACTIVE_BP\CarmelSchools_PC_ADDM_1-24-2022.dwg
SHEET SIZE: ARCH E1
PLOT STYLE: HPWG_FPWG.CTB

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913 RIMTEGATE Phone (248) 348-4960
North Ⓜ, Michigan 48167 Fax (248) 348-4968

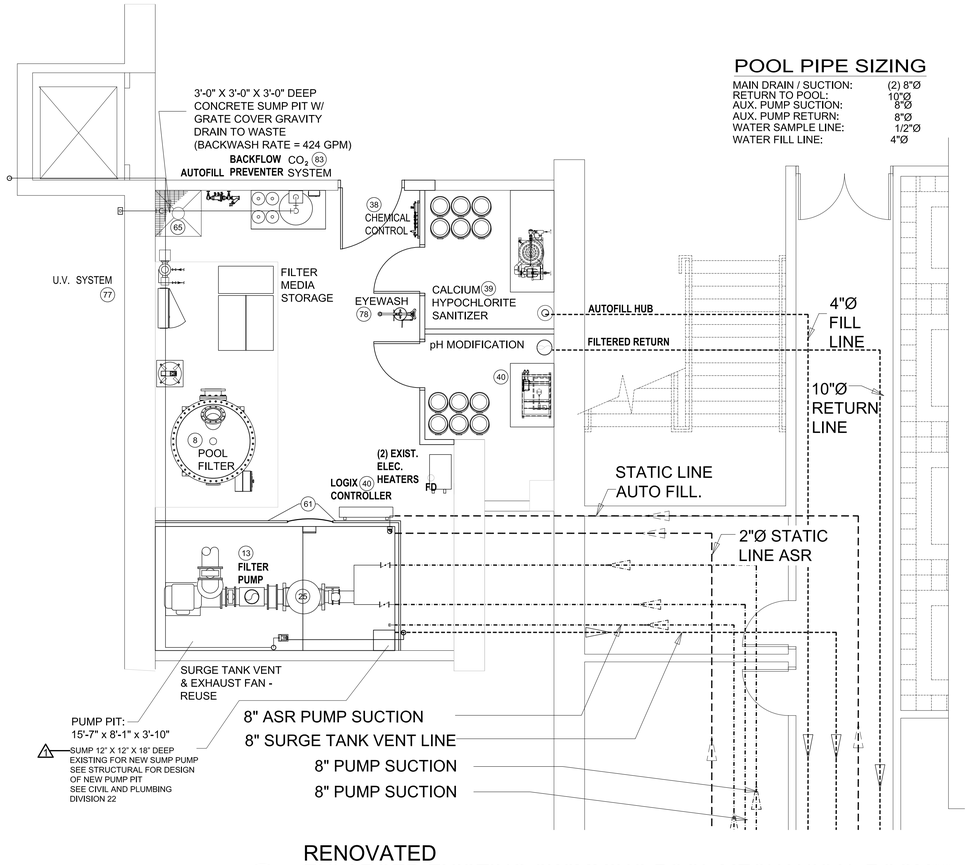
EXISTING POOL WORK:

DO NOT DRAIN POOL TO SANITARY SEWER.

POOL MUST BE NEUTRALIZED PRIOR TO DRAINING TO STORM SEWER.

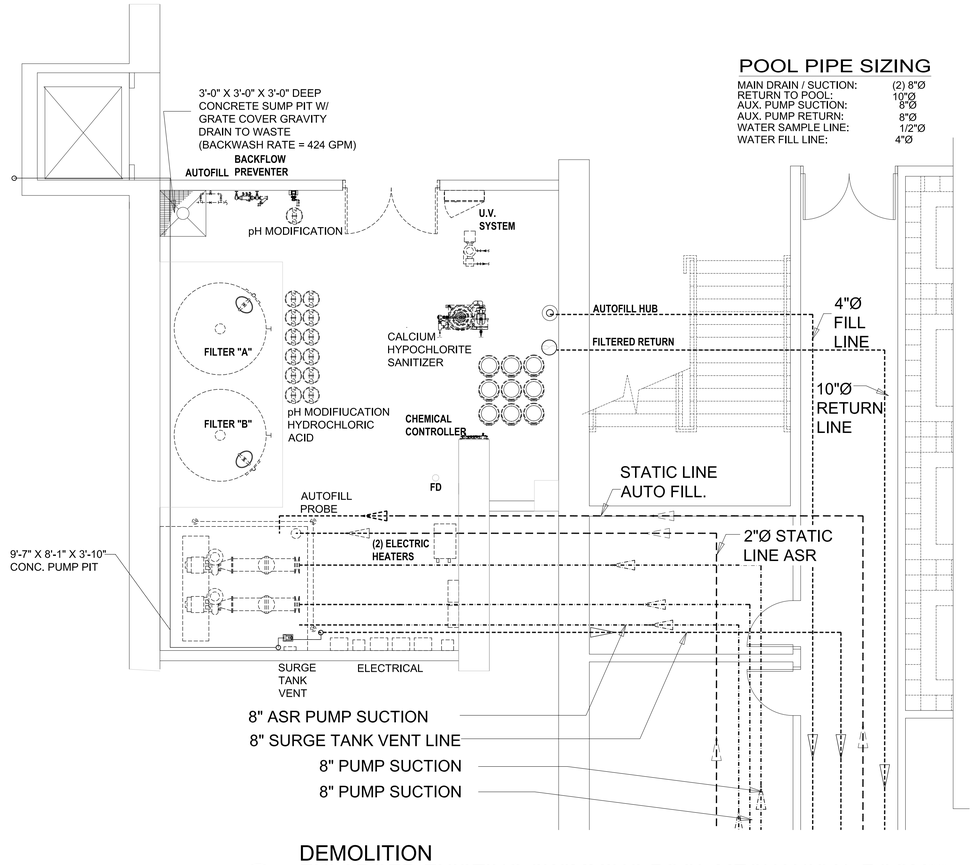
1. REMOVE @6' OF EXISTING PUMP PIT, HOUSEKEEPING PADS AND PUMP PIT FLOOR.
   A. NEW FILTER PUMP
   B. NEW STRAINER
   C. ALL NEW VALVES AND GAUGE
   D. NEW 12" X 12" X 18" DEEP SUMP WITH 110V 1/2HP PUMP
   E. NEW POLYMER STEP TREADS
   F. NEW PIT RAILS WITH CHAIN CLOSURE
   G. REUSE EXISTING STATIC LINE FOR NEW MANUAL/AUTO FILL
   H. ECCENTRICS AND CONCENTRICS
   I. PUMP BASE
2. REMOVE EXISTING PADDOCK FILTERS AND REPLACE WITH NEW STAINLESS STEEL AQUA REVIVAL REGENERATIVE FILTER SYSTEM. **DO NOT BACKWASH EXISTING TANKS PRIOR TO REMOVAL.**
3. REPLACE (2) EXISTING POOL PUMPS WITH (1) 50HP AURORA PUMP WITH POWER, CONTROLS AND DRIVE.
4. REPLACE EXISTING NEMATO STRAINER WITH FIBERGLASS MERMADE STRAINER WITH STAINLESS BASKET AND SPARE BASKET
5. ADD CO2 AND ACID RITE PH CONTROL SYSTEM
6. REPLACE EXISTING UV SYSTEM WITH PROMINENT
7. UPGRADE EXISTING PROMINENT CHEMICAL CONTROLLER WITH COMMUNICATIONS AND ADD AUTO CONTROL
8. REPLACE CHEMICAL FEED SYSTEM WITH ACCUTAB FEEDER
9. REPIPE AND INSTALL EXISTING 54 KW ELECTRIC HEATERS
10. REPLACE ALL VALVES ON ALL POOL RECIRCULATION PIPING
11. REPLACE FLOW METER WITH MAGMETER WIRED INTO CONTROLLER AND DRIVE.
12. EXHAUST THRU EXISTING ASR RETURN FROM EXISTING SURGE TANK*
13. VERIFY INTEGRITY OF EXISTING SURGE TANK SLAB*
14. ADD EMERGENCY EYEWASH IN FILTER ROOM
15. REPLACE AUTO FILL
16. REPLACE EXISTING STARTING PLATFORMS AND ANCHORS
17. ADD CEILING FAN*
18. REMOVE ALL EXISTING ELECTRICAL*
19. REPLACE EXISTING PUMP CONTROLS WITH CUSTOM NEMA 4X FRP PANEL
20. STRIP EXISTING WALLS AND CEILING AND REPAINT FILTER ROOM*
21. REUSE EXISTING FILTER HOUSEKEEPING PAD AND ADD 18" TALL PAD FOR NEW FILTER
22. ALL NEW ROOM LIGHTING*
23. NEW STORM DRAIN PIPING TO DRAIN POOL*
24. EXISTING SURGE TANK VENTILATION USING EXISTING ASR RETURN TO REMAIN
25. NEW EYEWASH
26. NEW COMMUNICATIONS MODULE
27. NEW FILTER SHALL FIT THRU NEW SINGLE DOOR
28. ALL ELECTRICAL/HOOKUPS BY DIVISION 26*
29. ELECTRICAL CONNECTIONS FOR ELECTRIC HEATERS*

*OTHER THAN DIV 13



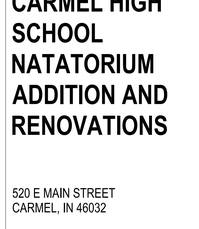
2 RENOVATED ENLARGED EXISTING SWIMMING POOL MECHANICAL ROOM PLAN NORTH

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



1 DEMOLITION ENLARGED EXISTING SWIMMING POOL MECHANICAL ROOM PLAN NORTH

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



KEY PLAN

CONSTRUCTION DOCUMENTS

PROJECT MANAGER: WJR
DRAWN BY: WJR
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

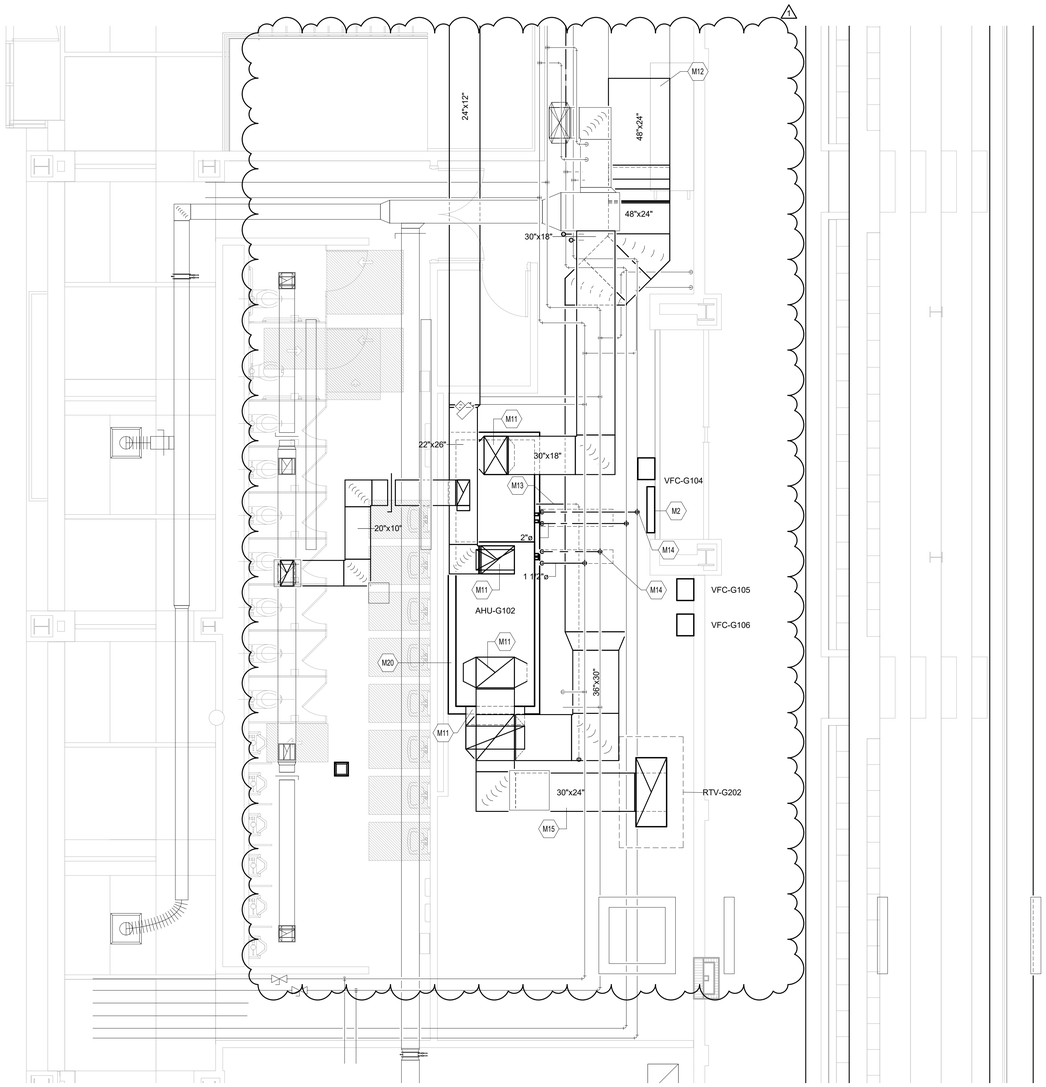
REV. NO.	DESCRIPTION	DATE
1	ADDENDUM NO.1	01.25.2022

UNIT N1 & N2 - LOWER LEVEL

ENLARGED EXISTING SWIMMING POOL MECHANICAL ROOM

PLE3.0

PLOTTED BY: BEN OSBORN PLOTTED: Monday, January 24, 2022 8:55:47 PM LOCATION: G:\ARP\ARCHITECTURE_BIP\Carmel\Natatorium\CHS_PLE3D1_R22.rvt PLOT STYLE: HPGG_REMAC.CTB SHEET SIZE: ARCH E1



FIRST FLOOR MECHANICAL ROOM PLAN - UNIT G2

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

MECHANICAL ROOM PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.
M. HYDRONIC SUPPLY AND RETURN PIPING SHALL BE THE SAME SIZE UNLESS OTHERWISE NOTED.

MECHANICAL ROOM PLAN NOTES (X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
M2	APPROXIMATE LOCATION OF AIR HANDLING UNIT CONTROL PANEL. COORDINATE LOCATION WITH ALL TRADES.
M11	TRANSITION DUCTWORK AS REQUIRED TO MAKE FINAL CONNECTION TO AIR HANDLING UNIT.
M12	CONNECT TO EXISTING DUCTWORK. MAKE ADJUSTMENTS AS NECESSARY.
M13	LINE SIZE INSULATED COPPER CONDENSATE TRAP TO O.S.D. COORDINATE EXACT LOCATION WITH ALL TRADES. REFER TO DETAIL.
M14	CONNECT TO EXISTING PIPING. MAKE ADJUSTMENTS AS NECESSARY.
M15	WRAP EXHAUST DUCTWORK WITH INSULATION FROM EXHAUST FAN TO ROOFTOP VENTILATOR OR WALL LOUVER.
M20	INSTALL EQUIPMENT ON 6" HIGH CONCRETE HOUSEKEEPING PAD.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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CARMEL CLAY SCHOOLS

ARCHITECT

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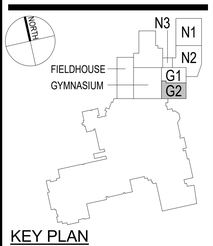

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOFF REGISTERED No. PE 12000001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.△	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL ROOM

M4.03

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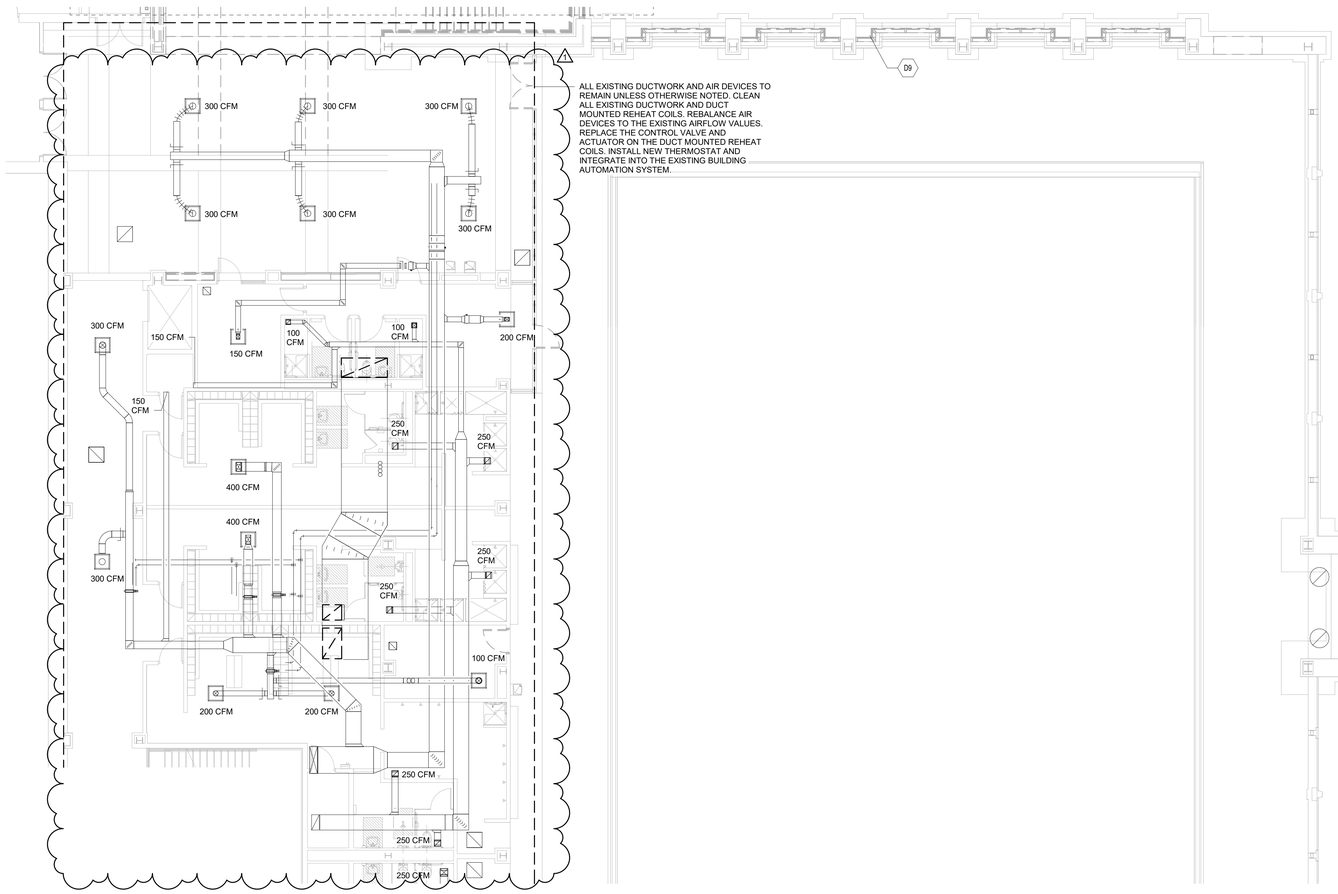

UNIT G1 - LOWER LEVEL DEMOLITION PLAN

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

MECHANICAL DEMOLITION PLAN GENERAL NOTES

A. THE DIVISION 23 CONTRACTOR SHALL VISIT THE PROJECT AND DETERMINE THE EXACT EXTENT OF THE DEMOLITION WORK REQUIRED BEFORE BIDDING THE PROJECT.

B. WHERE BUILDING SURFACES ARE DAMAGED BY THE REMOVAL OF OLD WORK, SAME SHALL BE PATCHED TO MATCH THE ADJACENT SURFACES BY THIS CONTRACTOR.

C. EXISTING OPENINGS WHICH ARE TO BE REUSED SHALL NOT BE REMOVED AND SHALL BE MODIFIED OR ENLARGED AS NEED BE TO SUIT THE NEW SYSTEMS. PROVIDE ALL REQUIRED CUTTING AND PATCHING TO MATCH ADJACENT SURFACES.

D. IF ASBESTOS IS PRESENT CONTACT THE CONSTRUCTION MANAGER, IT WILL BE REMOVED OR RENDERED HARMLESS UNDER SEPERATE CONTRACT BY THE OWNER.

E. THE OWNER SHALL HAVE THE RIGHT TO CLAIM ANY MATERIALS THAT ARE BEING DEMOLISHED PRIOR TO THE CONTRACTOR DISPOSING OF THEM OFF SITE. CONTRACTOR IS REQUIRED TO VERIFY THAT THE OWNER DOES NOT WANT TO CLAIM AN ITEM BEFORE DISPOSING THEM OFF SITE.

F. ALL FLOOR, WALL AND ROOF CUTTING WORK TO BE DONE BY DIVISION 23-HVAC CONTRACTOR UNLESS OTHERWISE NOTED. PATCH ALL FLOOR, WALL AND ROOF OPENINGS THAT ARE NOT REUSED TO MATCH ADJACENT CONSTRUCTION.

G. DIVISION 23 CONTRACTOR IS RESPONSIBLE TO REMOVE EXISTING CEILINGS TO DO WORK ABOVE THE CEILINGS AND REINSTALL THOSE CEILINGS AFTER COMPLETION OF WORK. IF ANY CEILING PADS OR GRIDS ARE DAMAGED, THIS CONTRACTOR SHALL REPLACE WITH NEW.

NO.	DESCRIPTION
D9	EXISTING RADIANT HEATING PIPING ALONG THIS WALL SHALL BE DISABLED AND ABANDONED IN PLACE.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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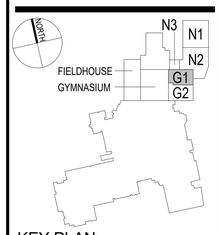

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

LOWER LEVEL MECHANICAL DEMOLITION PLAN - UNIT G1

MD.02

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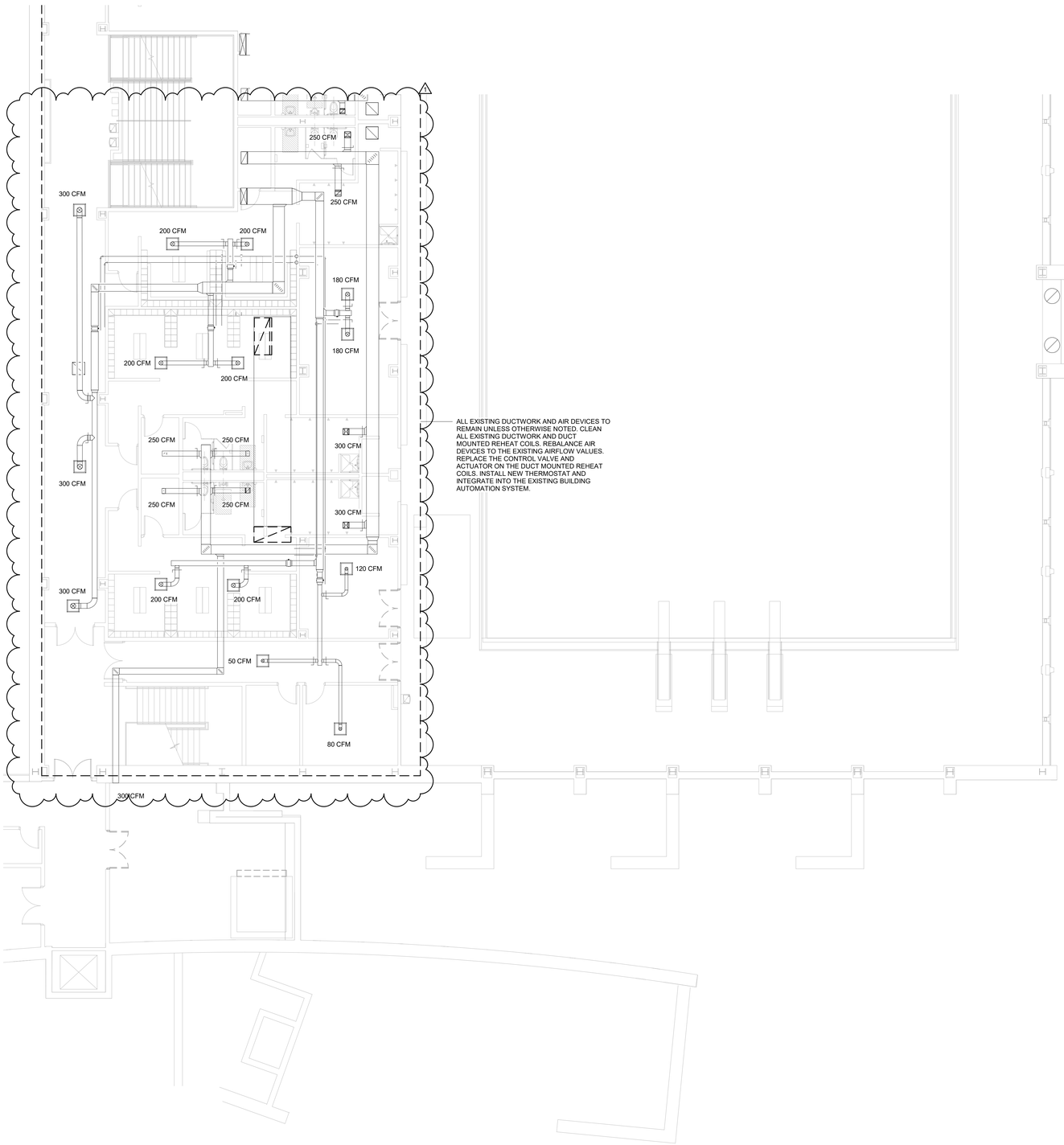

UNIT G2 - LOWER LEVEL DEMOLITION PLAN

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

MECHANICAL DEMOLITION PLAN GENERAL NOTES

A. THE DIVISION 23 CONTRACTOR SHALL VISIT THE PROJECT AND DETERMINE THE EXACT EXTENT OF THE DEMOLITION WORK REQUIRED BEFORE BIDDING THE PROJECT.

B. WHERE BUILDING SURFACES ARE DAMAGED BY THE REMOVAL OF OLD WORK, SAME SHALL BE PATCHED TO MATCH THE ADJACENT SURFACES BY THIS CONTRACTOR.

C. EXISTING OPENINGS WHICH ARE TO BE REUSED SHALL NOT BE REMOVED AND SHALL BE MODIFIED OR ENLARGED AS NEED BE TO SUIT THE NEW SYSTEMS. PROVIDE ALL REQUIRED CUTTING AND PATCHING TO MATCH ADJACENT SURFACES.

D. IF ASBESTOS IS PRESENT CONTACT THE CONSTRUCTION MANAGER, IT WILL BE REMOVED OR RENDERED HARMLESS UNDER SEPERATE CONTRACT BY THE OWNER.

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F. ALL FLOOR, WALL AND ROOF CUTTING WORK TO BE DONE BY DIVISION 23-HVAC CONTRACTOR UNLESS OTHERWISE NOTED. PATCH ALL FLOOR, WALL AND ROOF OPENINGS THAT ARE NOT REUSED TO MATCH ADJACENT CONSTRUCTION.

G. DIVISION 23 CONTRACTOR IS RESPONSIBLE TO REMOVE EXISTING CEILINGS TO DO WORK ABOVE THE CEILINGS AND REINSTALL THOSE CEILINGS AFTER COMPLETION OF WORK. IF ANY CEILING PADS OR GRIDS ARE DAMAGED, THIS CONTRACTOR SHALL REPLACE WITH NEW.

NO.	DESCRIPTION

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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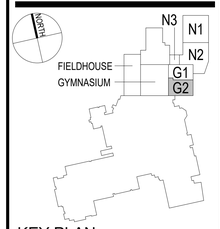

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

LOWER LEVEL MECHANICAL DEMOLITION PLAN - UNIT G2

MD.03

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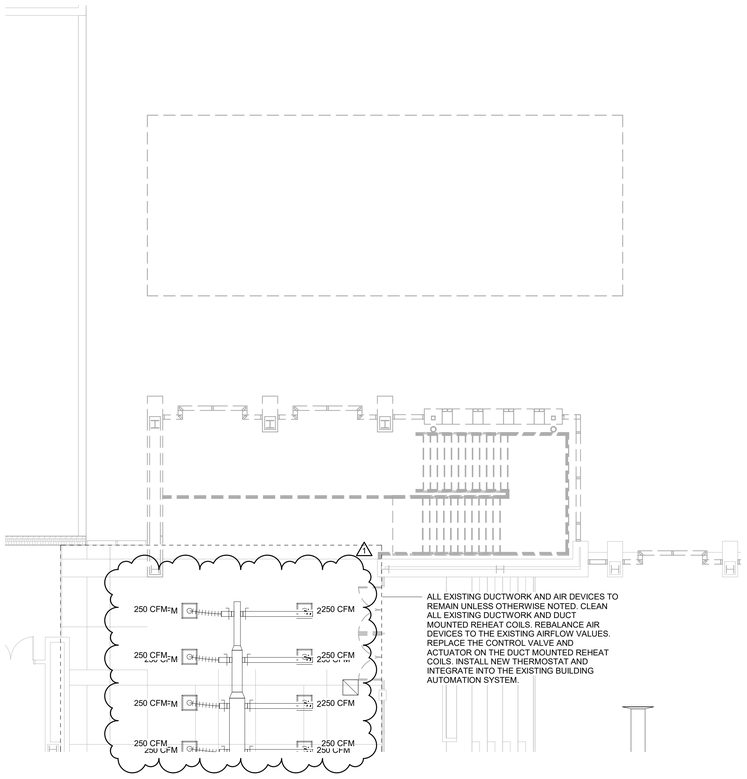

UNIT N3 - FIRST FLOOR - DEMOLITION PLAN

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

MECHANICAL DEMOLITION PLAN GENERAL NOTES

A. THE DIVISION 23 CONTRACTOR SHALL VISIT THE PROJECT AND DETERMINE THE EXACT EXTENT OF THE DEMOLITION WORK REQUIRED BEFORE BIDDING THE PROJECT.

B. WHERE BUILDING SURFACES ARE DAMAGED BY THE REMOVAL OF OLD WORK, SAME SHALL BE PATCHED TO MATCH THE ADJACENT SURFACES BY THIS CONTRACTOR.

C. EXISTING OPENINGS WHICH ARE TO BE REUSED SHALL NOT BE REMOVED AND SHALL BE MODIFIED OR ENLARGED AS NEED BE TO SUIT THE NEW SYSTEMS. PROVIDE ALL REQUIRED CUTTING AND PATCHING TO MATCH ADJACENT SURFACES.

D. IF ASBESTOS IS PRESENT CONTACT THE CONSTRUCTION MANAGER, IT WILL BE REMOVED OR RENDERED HARMLESS UNDER SEPERATE CONTRACT BY THE OWNER.

E. THE OWNER SHALL HAVE THE RIGHT TO CLAIM ANY MATERIALS THAT ARE BEING DEMOLISHED PRIOR TO THE CONTRACTOR DISPOSING OF THEM OFF SITE. CONTRACTOR IS REQUIRED TO VERIFY THAT THE OWNER DOES NOT WANT TO CLAIM AN ITEM BEFORE DISPOSING THEM OFF SITE.

F. ALL FLOOR, WALL AND ROOF CUTTING WORK TO BE DONE BY DIVISION 23-HVAC CONTRACTOR UNLESS OTHERWISE NOTED. PATCH ALL FLOOR, WALL AND ROOF OPENINGS THAT ARE NOT REUSED TO MATCH ADJACENT CONSTRUCTION.

G. DIVISION 23 CONTRACTOR IS RESPONSIBLE TO REMOVE EXISTING CEILINGS TO DO WORK ABOVE THE CEILINGS AND REINSTALL THOSE CEILINGS AFTER COMPLETION OF WORK. IF ANY CEILING PADS OR GRIDS ARE DAMAGED, THIS CONTRACTOR SHALL REPLACE WITH NEW.

NO.	DESCRIPTION

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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ARCHITECT

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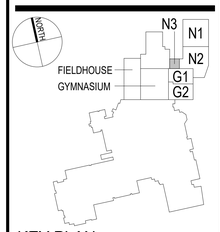

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT N3

MD.04

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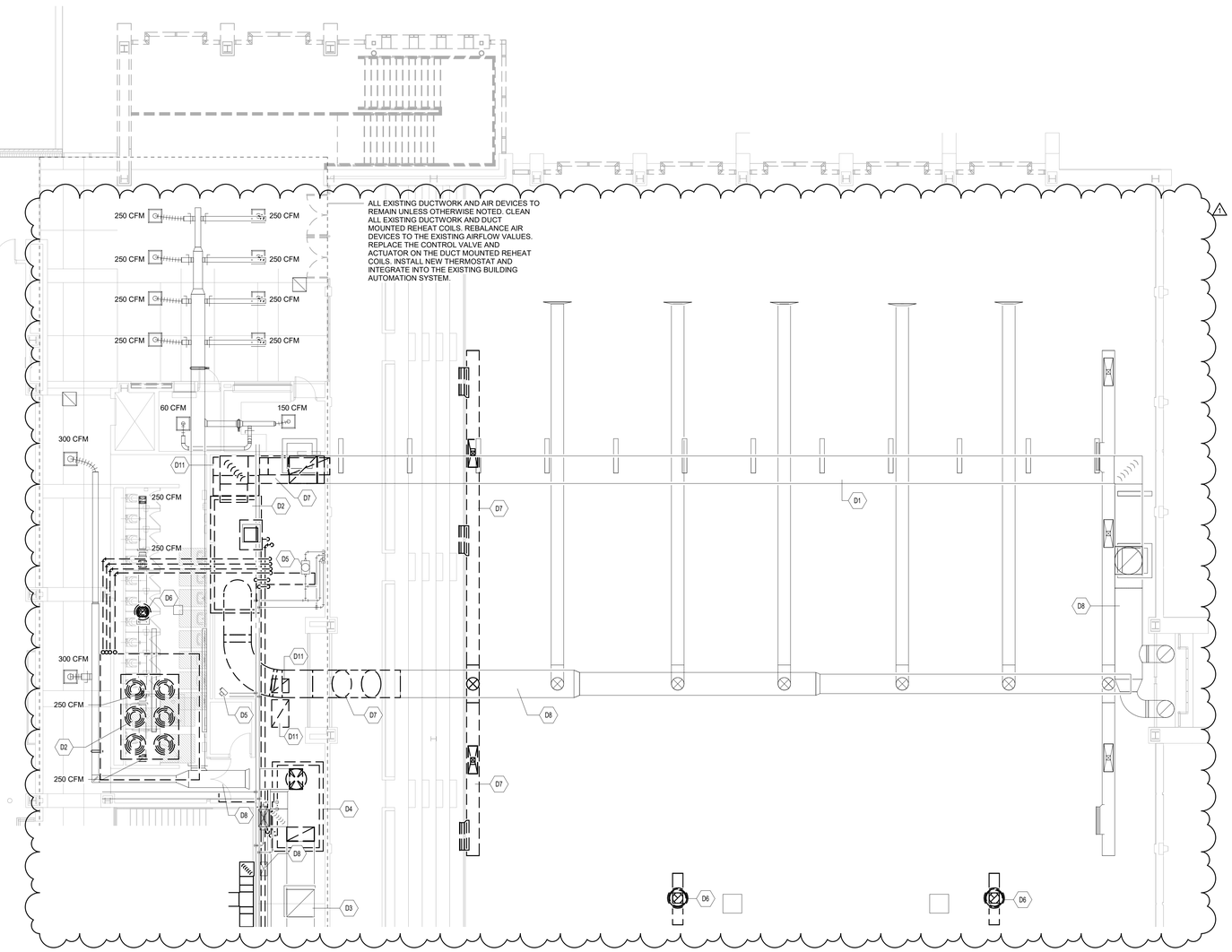
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ALL EXISTING DUCTWORK AND AIR DEVICES TO REMAIN UNLESS OTHERWISE NOTED. CLEAN ALL EXISTING DUCTWORK AND DUCT MOUNTED REHEAT COILS. REBALANCE AIR DEVICES TO THE EXISTING AIRFLOW VALUES. REPLACE THE CONTROL VALVE AND ACTUATOR ON THE DUCT MOUNTED REHEAT COILS. INSTALL NEW THERMOSTAT AND INTEGRATE INTO THE EXISTING BUILDING AUTOMATION SYSTEM.
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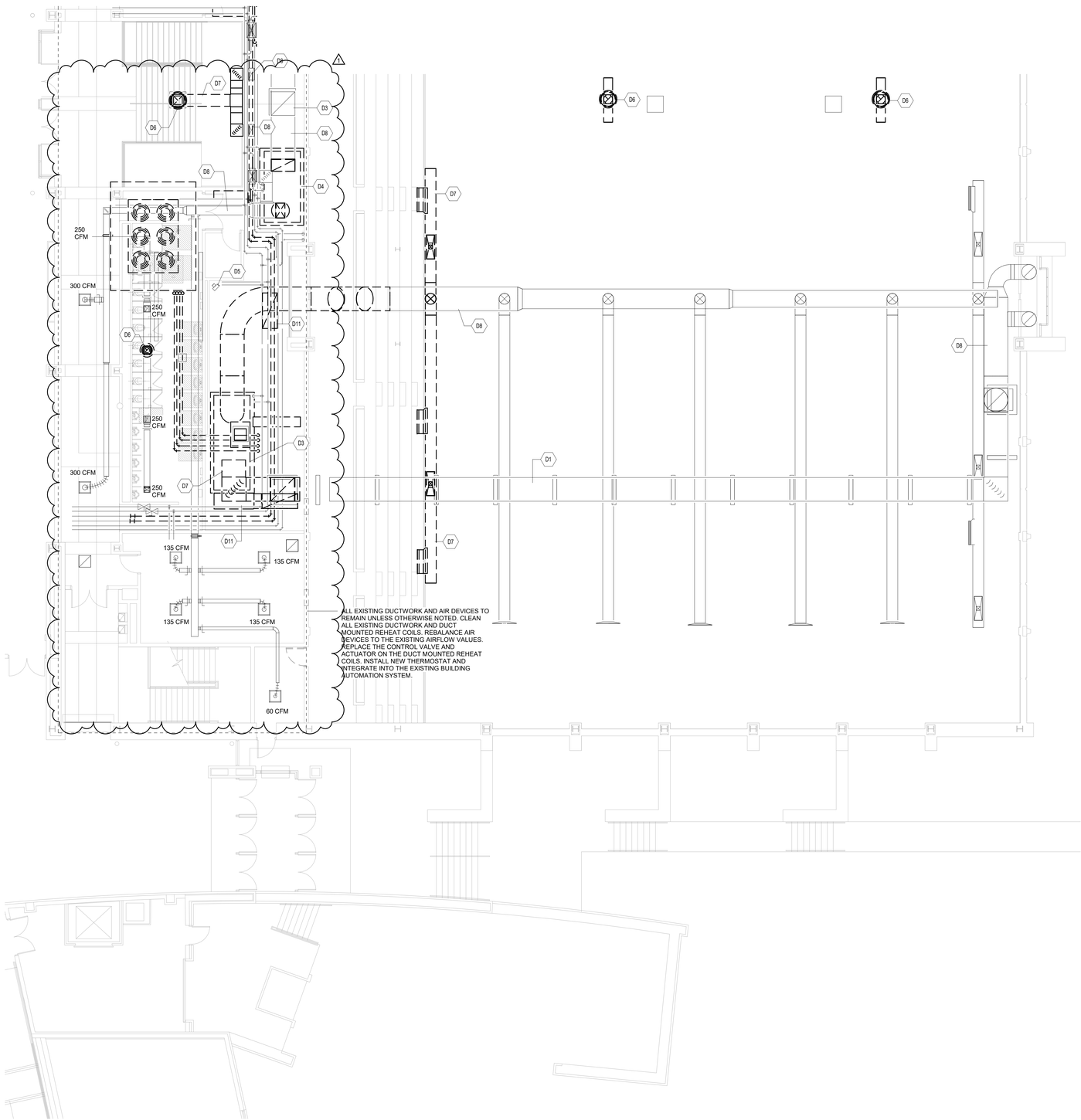

UNIT G2 - FIRST FLOOR DEMOLITION PLAN

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

MECHANICAL DEMOLITION PLAN GENERAL NOTES

A. THE DIVISION 23 CONTRACTOR SHALL VISIT THE PROJECT AND DETERMINE THE EXACT EXTENT OF THE DEMOLITION WORK REQUIRED BEFORE BIDDING THE PROJECT.
B. WHERE BUILDING SURFACES ARE DAMAGED BY THE REMOVAL OF OLD WORK, SAME SHALL BE PATCHED TO MATCH THE ADJACENT SURFACES BY THIS CONTRACTOR.
C. EXISTING OPENINGS WHICH ARE TO BE REUSED SHALL NOT BE REMOVED AND SHALL BE MODIFIED OR ENLARGED AS NEED BE TO SUIT THE NEW SYSTEMS. PROVIDE ALL REQUIRED CUTTING AND PATCHING TO MATCH ADJACENT SURFACES.
D. IF ASBESTOS IS PRESENT CONTACT THE CONSTRUCTION MANAGER. IT WILL BE REMOVED OR RENDERED HARMLESS UNDER SEPERATE CONTRACT BY THE OWNER.
E. THE OWNER SHALL HAVE THE RIGHT TO CLAIM ANY MATERIALS THAT ARE BEING DEMOLISHED PRIOR TO THE CONTRACTOR DISPOSING OF THEM OFF SITE. CONTRACTOR IS REQUIRED TO VERIFY THAT THE OWNER DOES NOT WANT TO CLAIM AN ITEM BEFORE DISPOSING THEM OFF SITE.
F. ALL FLOOR, WALL AND ROOF CUTTING WORK TO BE DONE BY DIVISION 23-HVAC CONTRACTOR UNLESS OTHERWISE NOTED. PATCH ALL FLOOR, WALL AND ROOF OPENINGS THAT ARE NOT REUSED TO MATCH ADJACENT CONSTRUCTION.
G. DIVISION 23 CONTRACTOR IS RESPONSIBLE TO REMOVE EXISTING CEILINGS TO DO WORK ABOVE THE CEILINGS AND REINSTALL THOSE CEILINGS AFTER COMPLETION OF WORK. IF ANY CEILING PADS OR GRIDS ARE DAMAGED, THIS CONTRACTOR SHALL REPLACE WITH NEW.

NO.	DESCRIPTION
D1	EXISTING EXTERIOR DUCTWORK SHALL BE REMOVED AND STORED FOR RE-INSTALLATION UPON COMPLETION OF ROOFING WORK. EXISTING DUCTWORK PENETRATING THE ROOF SHALL REMAIN IN PLACE AND SHALL BE COVERED. STORE THE EXISTING EXTERIOR DUCTWORK IN A LOCATION NOT EXPOSED TO WATER OR DIRT. CLEAN ALL DUCTWORK AND FITTINGS PRIOR TO RE-INSTALLATION. RE-INSTALL DUCTWORK IN THE EXACT SAME LOCATION AND MANNER AS THE PREVIOUS INSTALLATION. PROVIDE ALL NECESSARY ADJUSTMENTS AND ACCESSORIES FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
D3	EXISTING ROOFTOP VENTILATOR TO REMAIN.
D4	EXISTING LOCKER ROOM AIR HANDLING UNIT SHALL BE REMOVED AND DISPOSED OF OFF-SITE.
D5	EXISTING MECHANICAL EQUIPMENT TO REMAIN.
D6	EXISTING EXHAUST FAN AND ASSOCIATED ROOF CURB TO BE REMOVED.
D7	EXISTING DUCTWORK TO BE REMOVED BACK TO THE POINT INDICATED.
D8	EXISTING DUCTWORK TO REMAIN.
D11	EXISTING POOL RETURN DUCTWORK SHALL BE REMOVED. EXISTING DUCTWORK ON THE FLOOR BELOW SHALL BE ABANDONED IN PLACE. PATCH OPENING IN THE FLOOR TO MATCH ADJACENT CONSTRUCTION.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

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ARCHITECT

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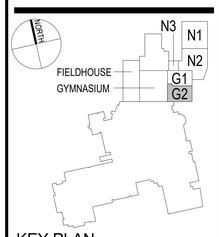

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOFF REGISTERED No. PE 12000001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT G2

MD.06

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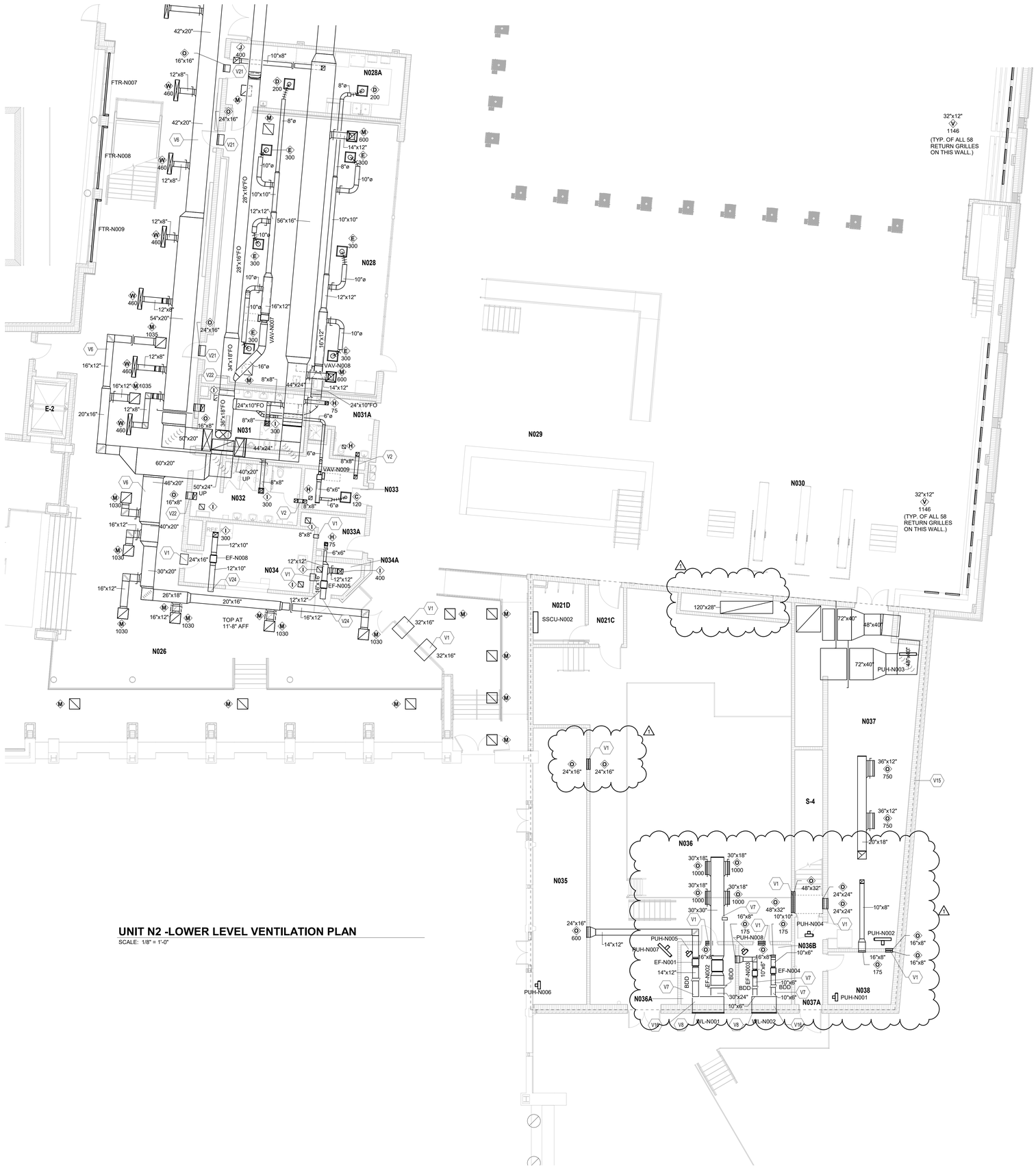

UNIT N2 -LOWER LEVEL VENTILATION PLAN

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

ROOM LEGEND - LOWER LEVEL UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N021A	TIMING	140 SF
N021C	VESTIBULE	74 SF
N021D	VIDEO DISTRIBUTION	114 SF
N028	HOSPITALITY	1668 SF
N028A	FOOD PREP	397 SF
N029	THERAPY POOL	1470 SF
N030	DIVING	1449 SF
N031	RESTROOM	219 SF
N032	RESTROOM	229 SF
N033	TECHNOLOGY	92 SF
N033A	A/V STORAGE	80 SF
N034	CONCESSIONS	150 SF
N034A	ELECTRICAL	49 SF
N035	POOL STORAGE	538 SF
N036	POOL EQUIPMENT	2789 SF
N036A	POOL EQUIPMENT	118 SF
N036B	POOL EQUIPMENT	114 SF
N037	POOL STORAGE	1139 SF
N037A	VESTIBULE	89 SF
N038	FIRE RISER	124 SF
N039	PASSAGE	690 SF
S-4	STAIR	166 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V1	AIR TRANSFER WALL OPENING LOCATED ABOVE THE CEILING. COORDINATE EXACT LOCATION WITH ALL TRADES.
V2	ACOUSTICALLY LINED AIR TRANSFER SOUND TRAP. EXTEND DUCTWORK UP TO PROVIDE NO LINE OF SITE FROM OPENING TO OPENING.
V6	EXPOSED DUCTWORK TO BE PAINTED. COORDINATE EXACT COLOR WITH ARCHITECT/ENGINEER. CLEAN AND PREPARE DUCTWORK TO ENSURE PAINT ADHERES TO DUCTWORK.
V7	WRAP EXHAUST DUCTWORK WITH INSULATION FROM WALL TO EXHAUST FAN(S).
V8	INSTALL DRIP PAN UNDER WALL LOUVER. PAN SHALL BE SEALED WATER-TIGHT. DRIP PAN TO EXTEND A MINIMUM OF 6 INCHES BEYOND DUCT.
V15	ALL DUCTWORK WITHIN THE DASHED LINES SHALL BE ALUMINUM OR STAINLESS STEEL. REFER TO SPECIFICATIONS.
V16	INSULATED SHEET METAL PLENUM MOUNTED BEHIND WALL LOUVER. TRANSITION BOTTOM OF DUCT AT A SLOPE DOWNWARD TO WALL LOUVER. SEAL ALL SEAMS AND EDGES WATER TIGHT. WRAP PLENUM WITH INSULATION. REFER TO DETAIL.
V21	AIR TRANSFER WALL OPENING LOCATED ABOVE THE CEILING. COORDINATE EXACT LOCATION WITH ALL TRADES. INSTALL AS HIGH AS POSSIBLE. PAINT GRILLE TO A COLOR AS SELECTED BY THE ARCHITECT.
V22	ACOUSTICALLY LINED AIR TRANSFER SOUND TRAP. EXTEND DUCTWORK UP TO PROVIDE NO LINE OF SITE FROM OPENING TO OPENING. INSTALL AS HIGH AS POSSIBLE. PAINT GRILLE TO A COLOR AS SELECTED BY THE ARCHITECT.
V24	DUCTWORK OPEN TO THE PLENUM. COVER THE OPENING WITH BIRDSCREEN.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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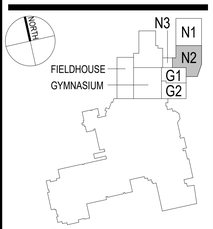

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

LOWER LEVEL VENTILATION PLAN - UNIT N2

M2.02

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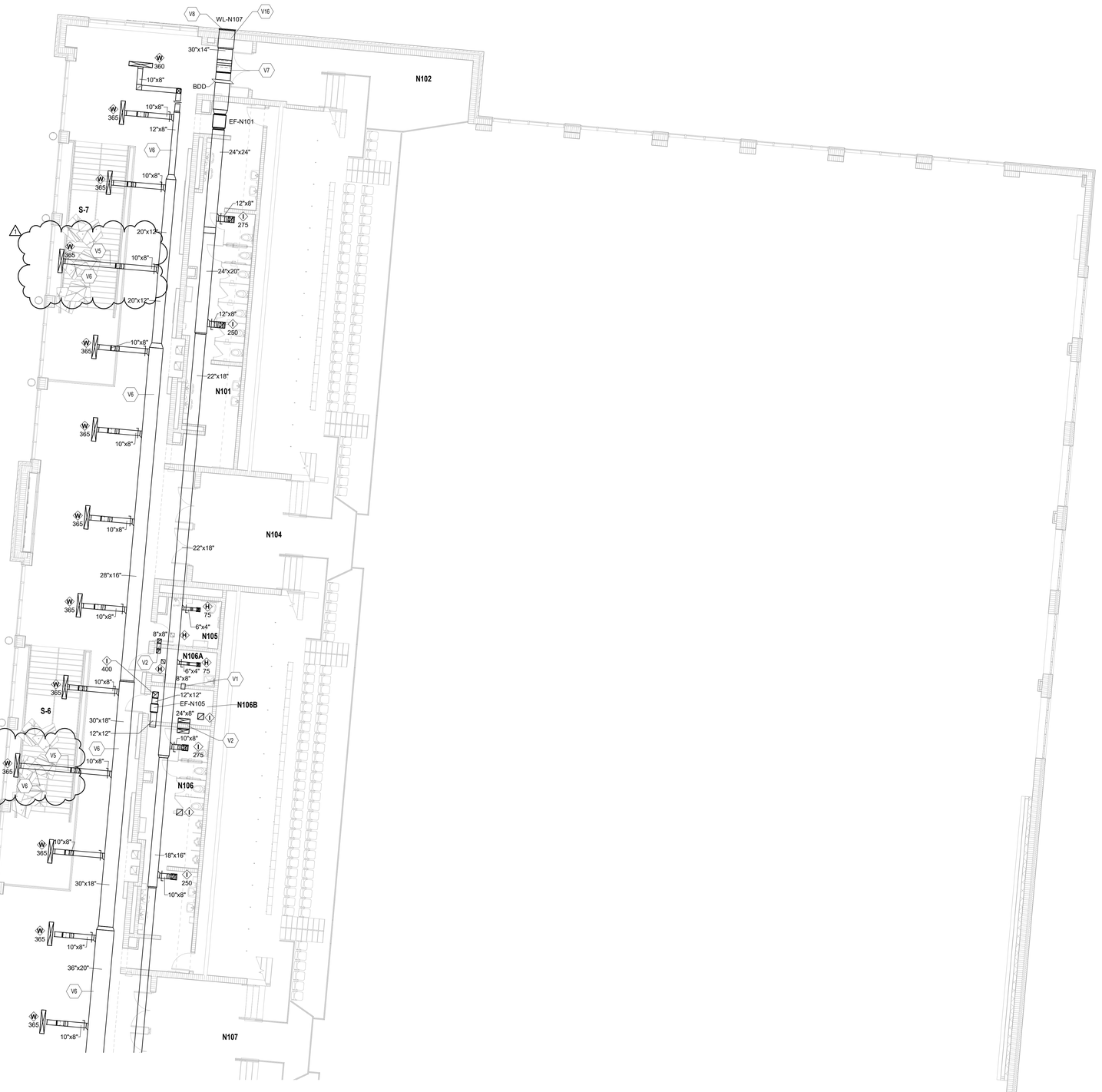

UNIT N1 - FIRST FLOOR VENTILATION PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT N1

ROOM NO.	ROOM NAME	AREA (SF)
N101	WOMEN'S RESTROOM	603 SF
N102	POOL BALCONY	412 SF
N103	UPPER CONCOURSE	6428 SF
N104	VOMITORIUM	389 SF
N105	FAMILY RR	81 SF
N106	MEN'S RESTROOM	407 SF
N107	VOMITORIUM	390 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V1	AIR TRANSFER WALL OPENING LOCATED ABOVE THE CEILING. COORDINATE EXACT LOCATION WITH ALL TRADES.
V2	ACOUSTICALLY LINED AIR TRANSFER SOUND TRAP. EXTEND DUCTWORK TO PROVIDE NO LINE OF SITE FROM OPENING TO OPENING.
V5	DUCTWORK PROVIDED WITH INTERNAL LINED INSULATION.
V6	EXPOSED DUCTWORK TO BE PAINTED. COORDINATE EXACT COLOR WITH ARCHITECT/ENGINEER. CLEAN AND PREPARE DUCTWORK TO ENSURE PAINT ADHERES TO DUCTWORK.
V7	WRAP EXHAUST DUCTWORK WITH INSULATION FROM WALL TO EXHAUST FAN(S).
V8	INSTALL DRIP PAN UNDER WALL LOUVER. PAN SHALL BE SEALED WATER-TIGHT. DRIP PAN TO EXTEND A MINIMUM OF 6 INCHES BEYOND DUCT.
V16	INSULATED SHEET METAL PLENUM MOUNTED BEHIND WALL LOUVER. TRANSITION BOTTOM OF DUCT AT A SLOPE DOWNWARD TO WALL LOUVER. SEAL ALL SEAMS AND EDGES WATER TIGHT. WRAP PLENUM WITH INSULATION. REFER TO DETAIL.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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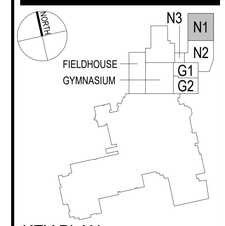

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOPF REGISTERED No. PE 12000301 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR VENTILATION PLAN - UNIT N1

M2.06

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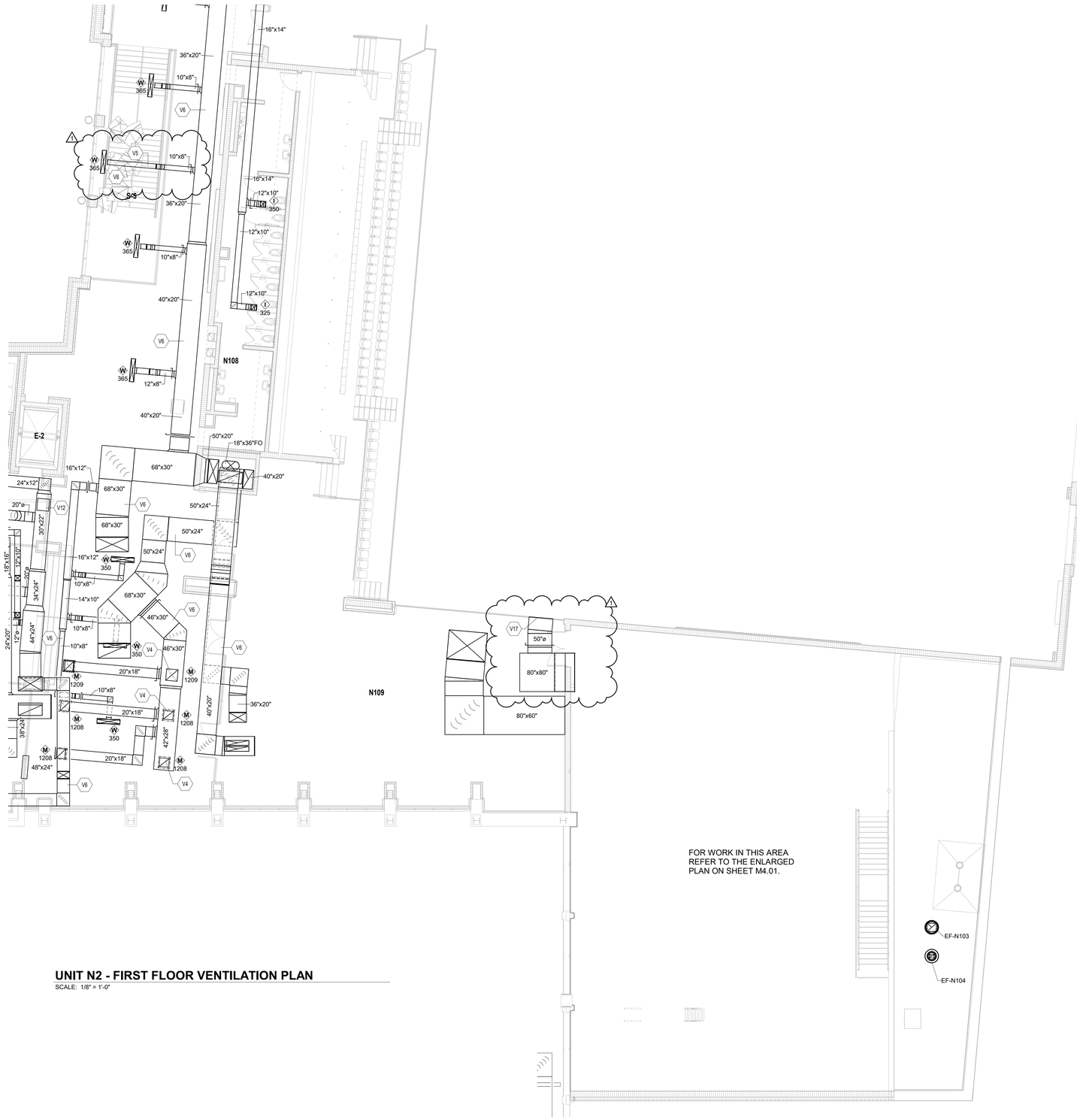

UNIT N2 - FIRST FLOOR VENTILATION PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N108	WOMEN'S RESTROOM	658 SF
N110	MECHANICAL ROOM	4206 SF
S-4	STAIR	166 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V4	PROVIDE VOLUME DAMPER IN VERTICAL DUCTWORK TO AIR DEVICE.
V5	DUCTWORK PROVIDED WITH INTERNAL LINED INSULATION.
V6	EXPOSED DUCTWORK TO BE PAINTED. COORDINATE EXACT COLOR WITH ARCHITECT/ENGINEER. CLEAN AND PREPARE DUCTWORK TO ENSURE PAINT ADHERES TO DUCTWORK.
V12	APPROXIMATE LOCATION OF DUCT STATIC PRESSURE SENSOR. SENSOR PROVIDED BY TEMPERATURE CONTROL CONTRACTOR AND INSTALLED BY HVAC CONTRACTOR.
V17	TRANSITION TO FABRIC DUCTWORK AT THIS APPROXIMATE LOCATION. FABRIC DUCTWORK TO BE MOUNTED IN A FASHION WHERE DUCTWORK DOES NOT TOUCH STEEL OR ANY OTHER BUILDING COMPONENT WHILE INFLATED OR DEFLATED. INSTALL FABRIC DUCTWORK WITH A 1-ROW CABLE SYSTEM. COORDINATE EXACT LOCATION WITH ALL OTHER TRADES. CUSTOM COLOR TO BE SELECTED BY THE ARCHITECT/ENGINEER. REFER TO DETAILS AND SPECIFICATIONS.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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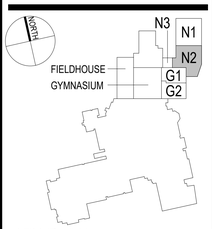

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOFF REGISTERED No. PE 12000001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR VENTILATION PLAN - UNIT N2

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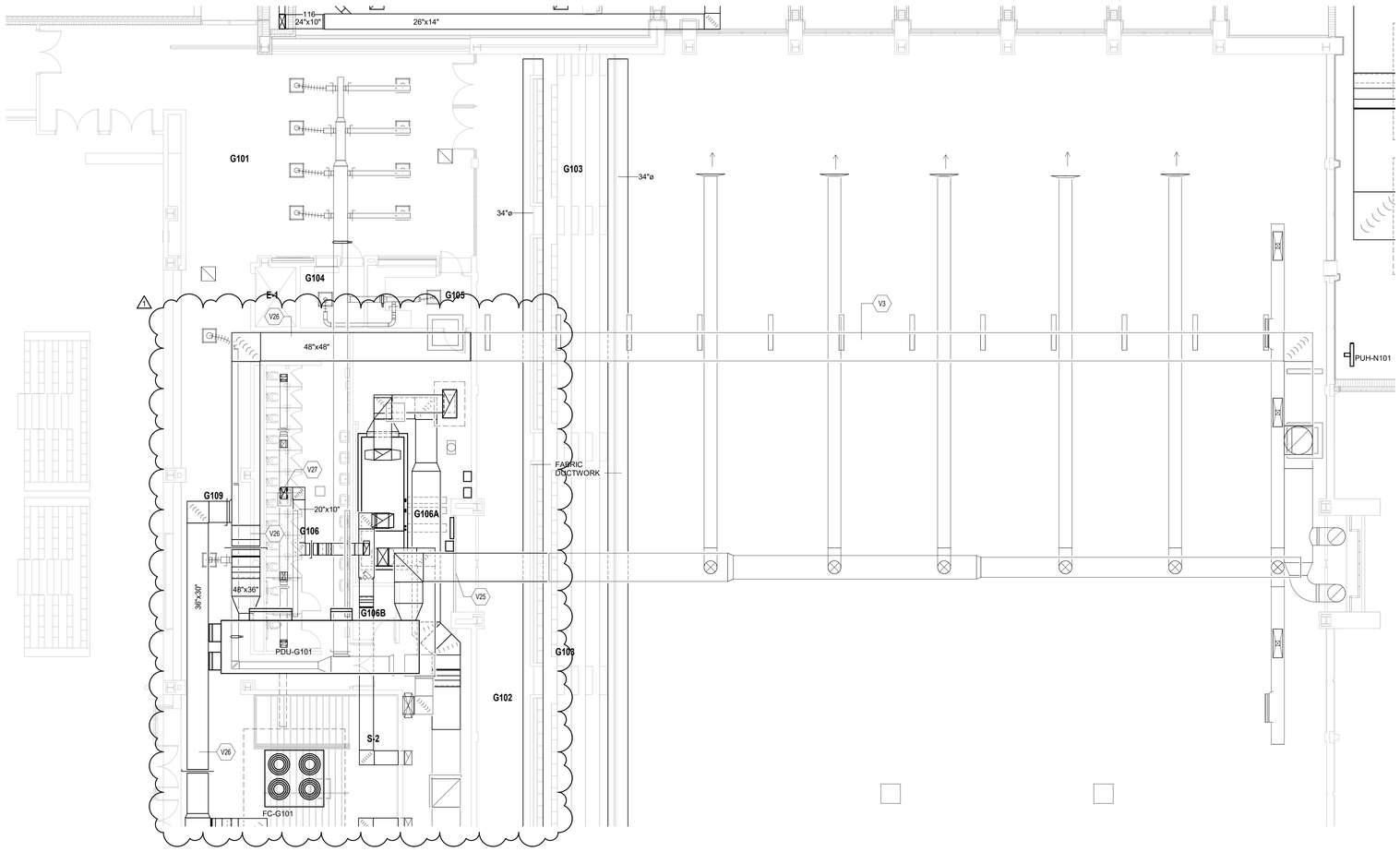

UNIT G1 - FIRST FLOOR VENTILATION PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT G1

ROOM NO.	ROOM NAME	AREA (SF)
E-1	ELEVATOR	50 SF
G101	LOBBY	1590 SF
G102	SEATING CROSS AISLE	1669 SF
G103	POOL SEATING	2418 SF
G104	TICKETS	79 SF
G105	CONCESSIONS	130 SF
G106	WOMEN'S RESTROOM	612 SF
G106A	MECHANICAL	871 SF
G106B	TECHNOLOGY	46 SF
G109	CORRIDOR	1668 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V3	RE-INSTALL THE EXISTING RETURN DUCTWORK ON THE ROOF IN THE EXACT SAME LOCATION AND MANNER AS THE PREVIOUS INSTALLATION. CLEAN ALL DUCTWORK AND FITTINGS PRIOR TO RE-INSTALLATION. PROVIDE ALL NECESSARY ADJUSTMENTS AND ACCESSORIES FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
V25	ROUTE DUCTWORK THROUGH THE EXTERIOR WALL AND THEN CONNECT TO THE EXISTING INSIDE THE BUILDING.
V26	CONNECT TO EXISTING DUCTWORK. MAKE ADJUSTMENTS AS NECESSARY. MATCH EXISTING DUCTWORK TYPE/CONSTRUCTION. INSTALL DUCTWORK ROOF SUPPORTS BELOW DUCTWORK AS REQUIRED.
V27	CONNECT TO EXISTING DUCTWORK. MAKE ADJUSTMENTS AS NECESSARY.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

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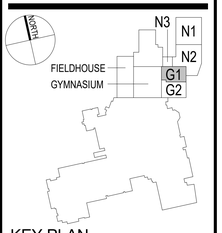

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOFF REGISTERED No. PE 12005001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR VENTILATION PLAN - UNIT G1

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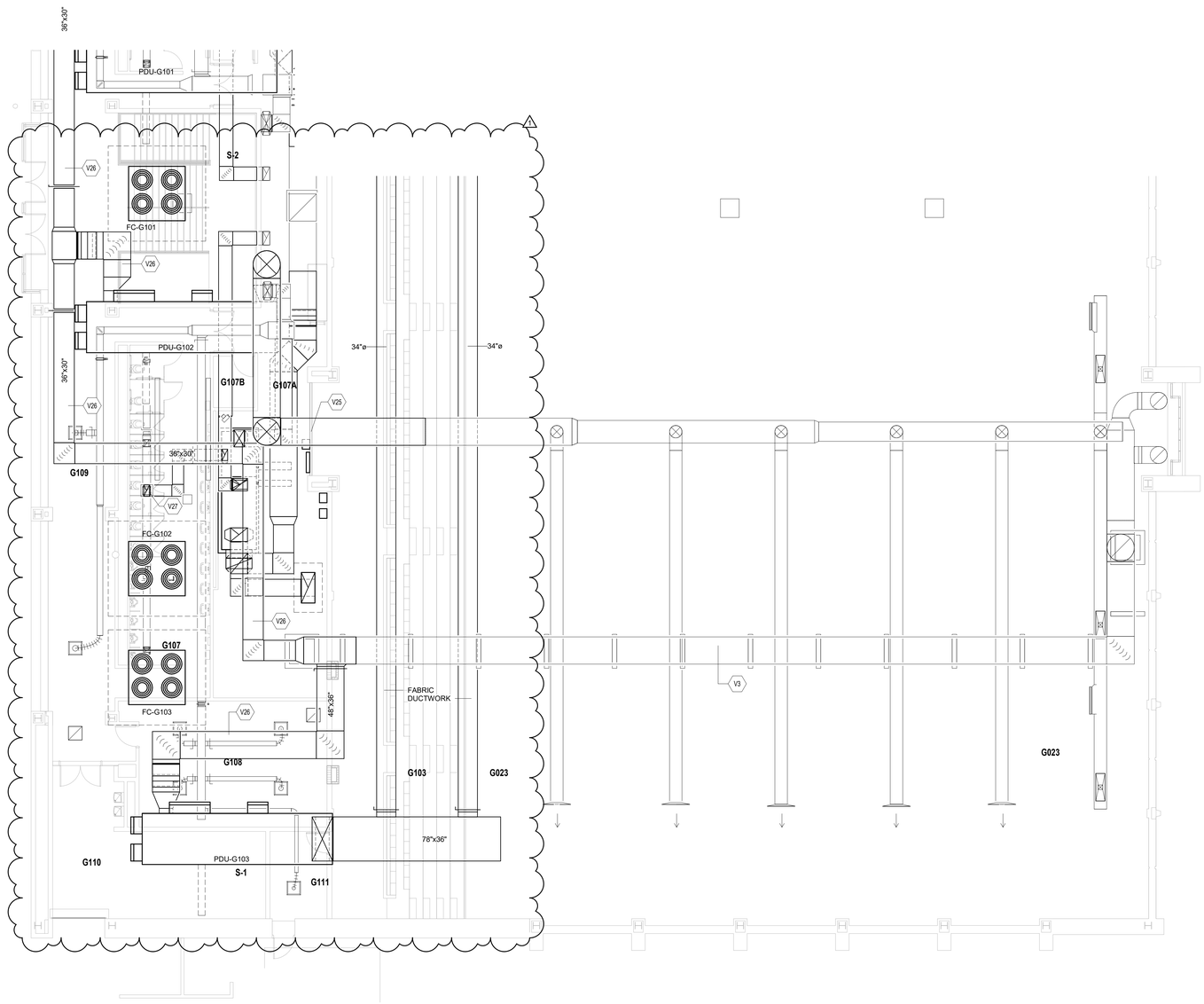

UNIT G2 - FIRST FLOOR VENTILATION PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT G2

ROOM NO.	ROOM NAME	AREA (SF)
G107	MEN'S RESTROOM	691 SF
G107A	MECHANICAL	980 SF
G107B	ELECTRICAL	46 SF
G108	TEAM ROOM	522 SF
G110	PASSAGE	281 SF
G111	VESTIBULE	108 SF
S-1	STAIR	231 SF
S-2	STAIR	529 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
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D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES

(X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V3	RE-INSTALL THE EXISTING RETURN DUCTWORK ON THE ROOF IN THE EXACT SAME LOCATION AND MANNER AS THE PREVIOUS INSTALLATION. CLEAN ALL DUCTWORK AND FITTINGS PRIOR TO RE-INSTALLATION. PROVIDE ALL NECESSARY ADJUSTMENTS AND ACCESSORIES FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
V25	ROUTE DUCTWORK THROUGH THE EXTERIOR WALL AND THEN CONNECT TO THE EXISTING INSIDE THE BUILDING.
V26	CONNECT TO EXISTING DUCTWORK. MAKE ADJUSTMENTS AS NECESSARY. MATCH EXISTING DUCTWORK TYPE/CONSTRUCTION. INSTALL DUCTWORK ROOF SUPPORTS BELOW DUCTWORK AS REQUIRED.
V27	CONNECT TO EXISTING DUCTWORK. MAKE ADJUSTMENTS AS NECESSARY.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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CARMEL CLAY SCHOOLS

ARCHITECT

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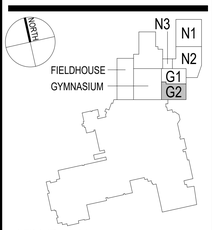

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.△	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR VENTILATION PLAN - UNIT G2

M2.10

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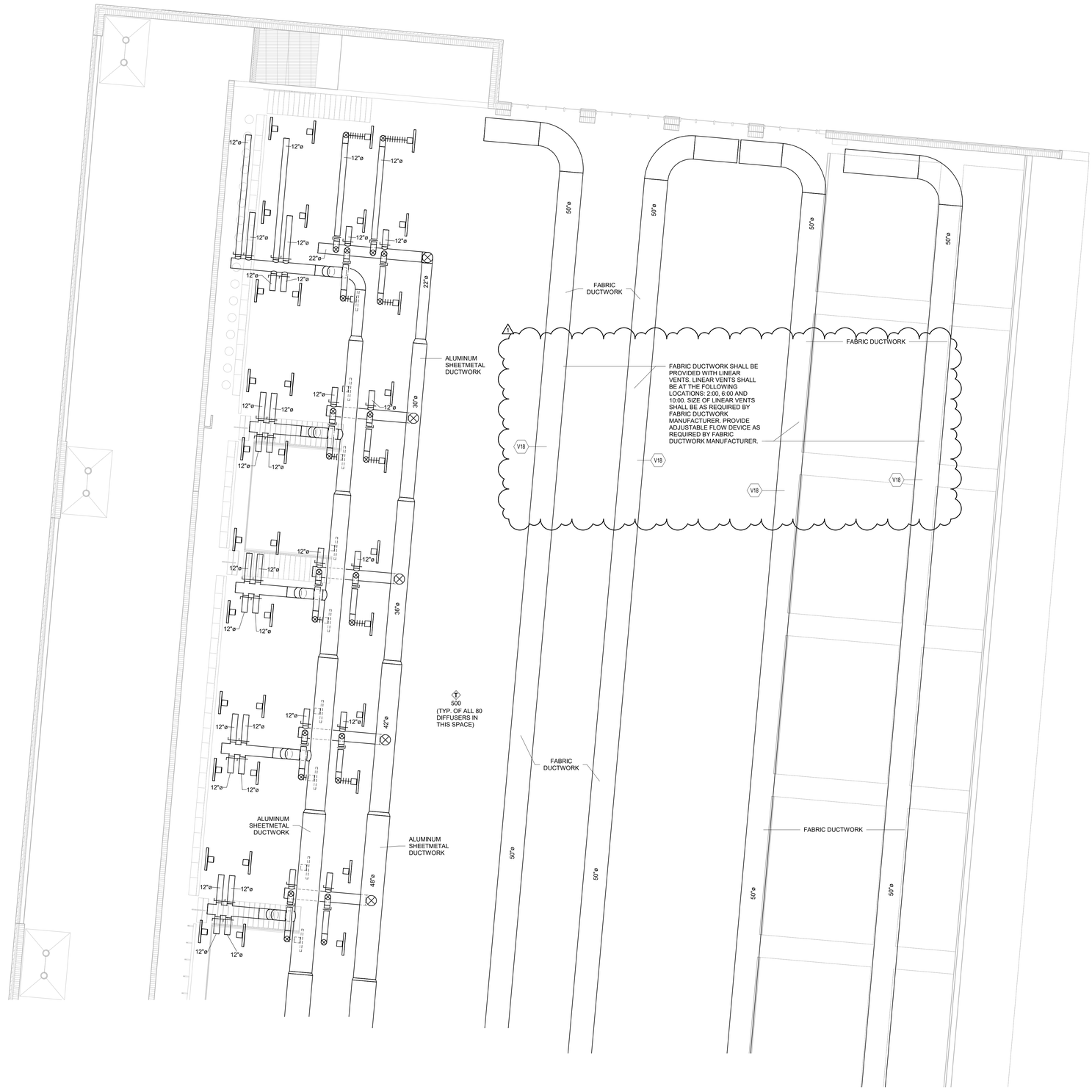

UNIT N1 - UPPER SEATING LEVEL VENTILATION PLAN

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

ROOM LEGEND - UPPER SEATING LEVEL UNIT N1

ROOM NO.	ROOM NAME	AREA (SF)
N201	CROSS AISLE	1369 SF
N202	POOL SEATING	1869 SF
N203	POOL SEATING	2086 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES (X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V18	ROUTE DUCTWORK THROUGH STRUCTURAL STEEL AS REQUIRED. COORDINATE WITH STRUCTURAL CONTRACTOR AND ALL OTHER TRADES.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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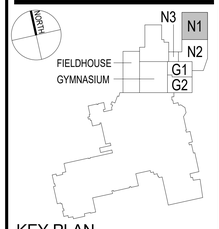

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOPF REGISTERED No. PE 12900001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

UPPER SEATING LEVEL VENTILATION PLAN - UNIT N1

M2.11

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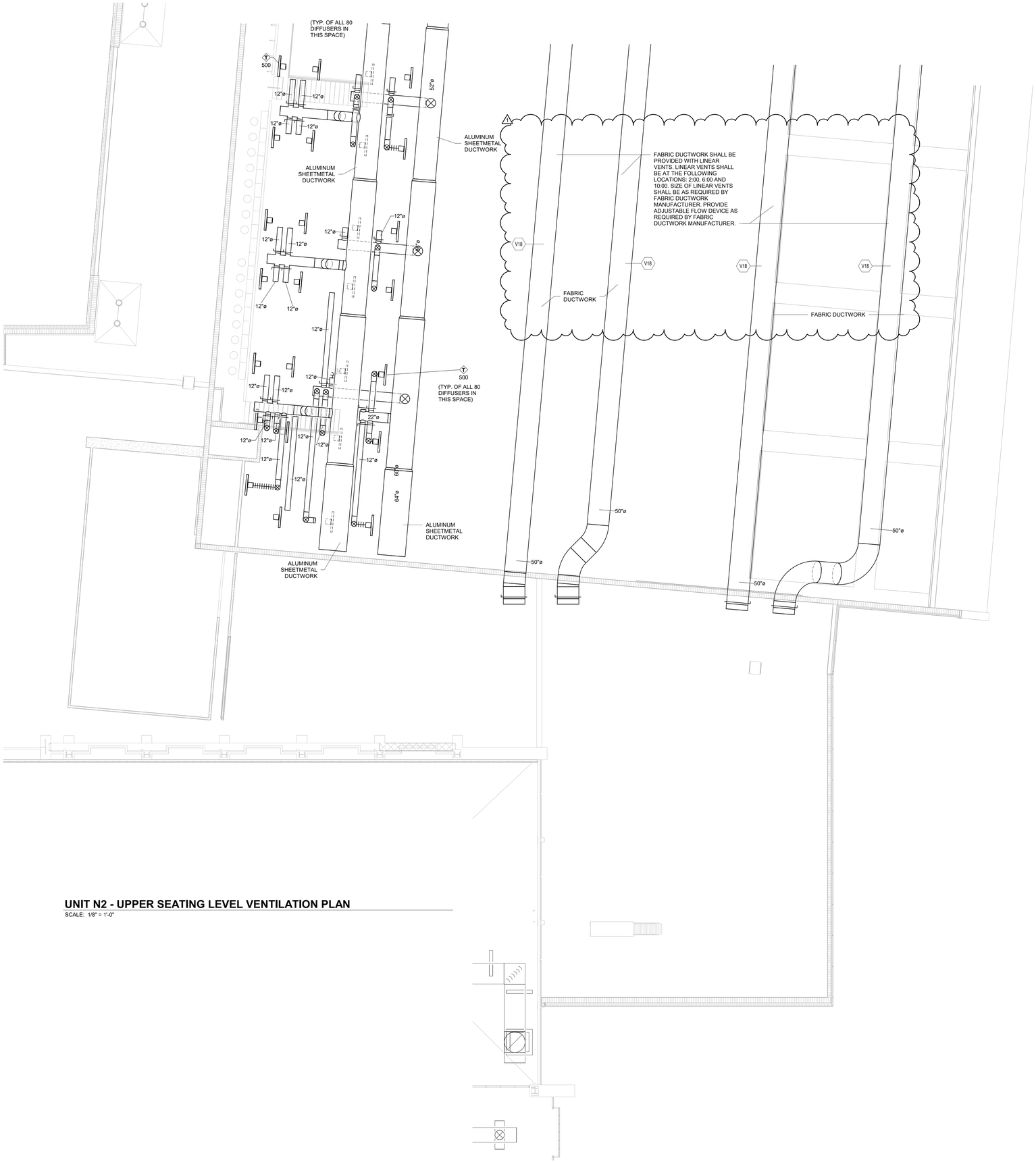

UNIT N2 - UPPER SEATING LEVEL VENTILATION PLAN

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

ROOM LEGEND - UPPER SEATING LEVEL UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N204	POOL SEATING	2206 SF
S-4	STAIR	166 SF

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
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J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.

VENTILATION PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V18	ROUTE DUCTWORK THROUGH STRUCTURAL STEEL AS REQUIRED. COORDINATE WITH STRUCTURAL CONTRACTOR AND ALL OTHER TRADES.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

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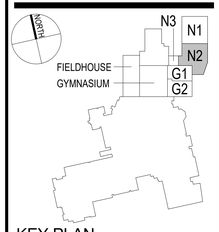

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HORF REGISTERED No. PE 12200001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

UPPER SEATING LEVEL VENTILATION PLAN - UNIT N2

M2.12

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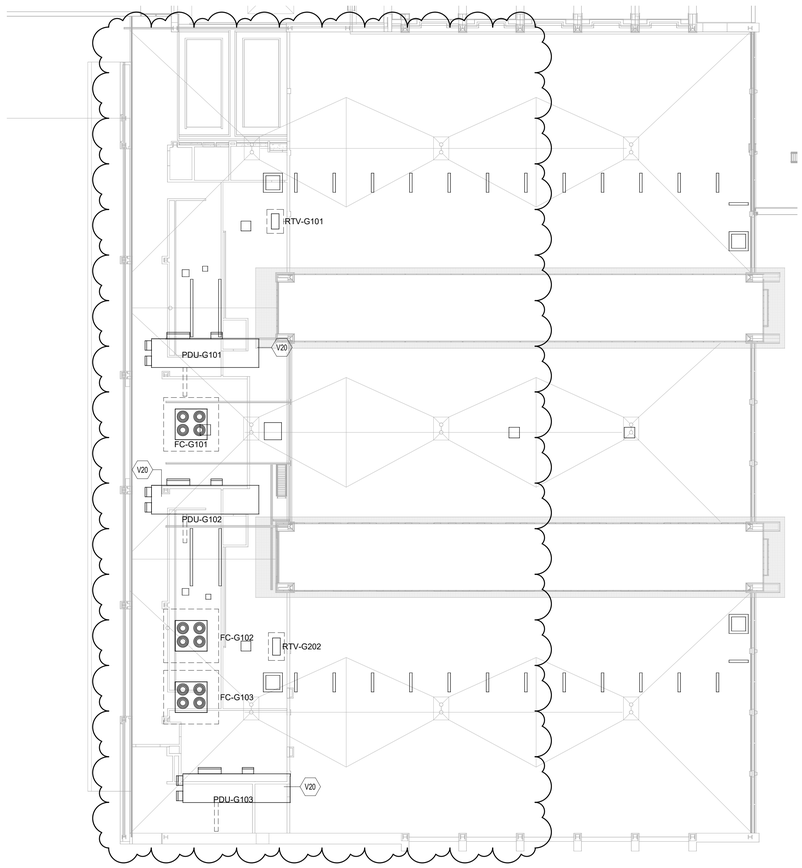

UNIT G - MECHANICAL ROOF PLAN
SCALE: 1/16" = 1'-0"

VENTILATION PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
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F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
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VENTILATION PLAN NOTES (X)
(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
V20	LINE SIZE PVC CONDENSATE TRAP TO ROOF DRAIN. COORDINATE EXACT LOCATION WITH ALL TRADES. REFER TO DETAIL.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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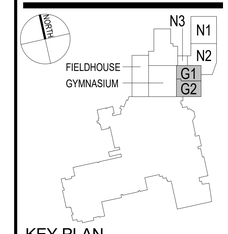

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOOF REGISTERED No. PE 12000001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL ROOF PLAN - UNIT G

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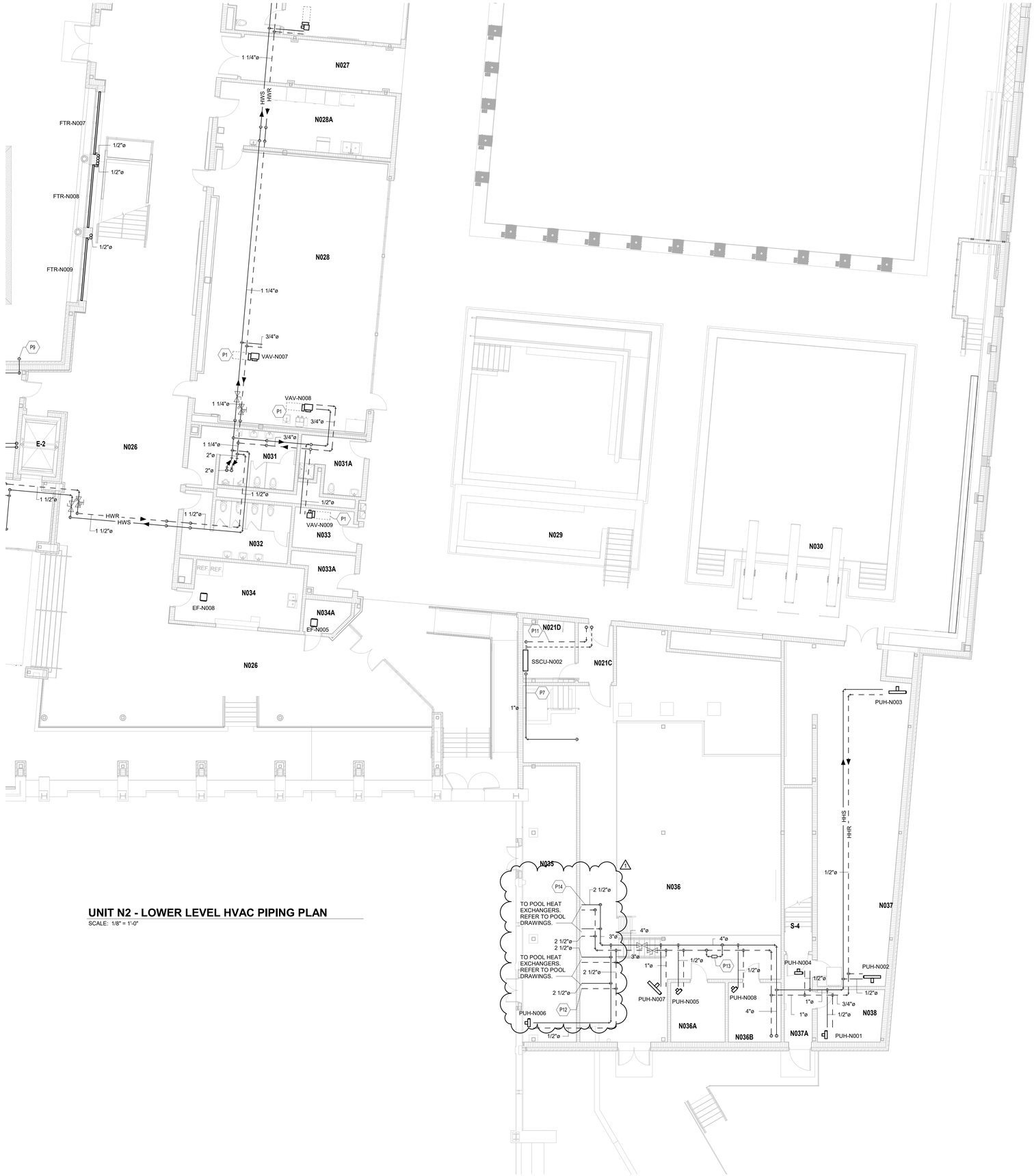

UNIT N2 - LOWER LEVEL HVAC PIPING PLAN

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

ROOM LEGEND - LOWER LEVEL UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N021A	TIMING	140 SF
N021C	VESTIBULE	74 SF
N021D	VIDEO DISTRIBUTION	114 SF
N028	HOSPITALITY	1668 SF
N028A	FOOD PREP	397 SF
N029	THERAPY POOL	1470 SF
N030	DIVING	1449 SF
N031	RESTROOM	219 SF
N032	RESTROOM	229 SF
N033	TECHNOLOGY	92 SF
N033A	A/V STORAGE	80 SF
N034	CONCESSIONS	150 SF
N034A	ELECTRICAL	49 SF
N035	POOL STORAGE	538 SF
N036	POOL EQUIPMENT	2789 SF
N036A	POOL EQUIPMENT	118 SF
N036B	POOL EQUIPMENT	114 SF
N037	POOL STORAGE	1139 SF
N037A	VESTIBULE	89 SF
N038	FIRE RISER	124 SF
N039	PASSAGE	690 SF
S-4	STAIR	166 SF

HVAC PIPING PLAN GENERAL NOTES

A. ALL PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OPSTRUCTIONS.
D. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
E. HYDRONIC SUPPLY AND RETURN PIPING SHALL BE THE SAME SIZE UNLESS OTHERWISE NOTED.

HVAC PIPING PLAN NOTES

(X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
P1	DASHED LINE INDICATED APPROXIMATE CLEARANCE REQUIRED IN FRONT OF VARIABLE VOLUME TERMINAL UNIT CONTROL PANEL. COORDINATE LOCATION WITH ALL TRADES.
P7	LINE SIZE INSULATED COPPER CONDENSATE TRAP TO O.S.D. COORDINATE EXACT LOCATION WITH ALL TRADES. REFER TO DETAIL.
P9	LINE SIZE INSULATED COPPER CONDENSATE TRAP ROUTED THROUGH THE WALL AND TURNED DOWN. END OF PIPE TO BE CUT AT A 45 DEGREE ANGLE. SEAL WALL PENETRATION WATER-TIGHT. COORDINATED EXACT LOCATION WITH ALL TRADES. REFER TO DETAIL.
P11	REFRIGERANT LINES TO BE SIZED PER SPLIT SYSTEM MANUFACTURERS RECOMMENDATIONS.
P12	INSTALL 3-WAY VALVE ON THE COMPETITION POOL HEAT EXCHANGER. COORDINATE EXACT LOCATION WITH POOL EQUIPMENT MANUFACTURER.
P13	DIFFERENTIAL PRESSURE TRANSMITTER FOR HEATING WATER VARIABLE VOLUME PUMP CONTROL. TRANSMITTER PROVIDED BY TEMPERATURE CONTROL CONTRACTOR AND INSTALLED BY MECHANICAL CONTRACTOR.
P14	INSTALL 3-WAY VALVE ON THE DIVING POOL HEAT EXCHANGER. COORDINATE EXACT LOCATION WITH POOL EQUIPMENT MANUFACTURER.

VERIFICATION NOTE

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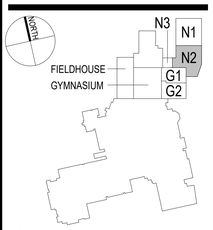

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

LOWER LEVEL PIPING PLAN - UNIT N2

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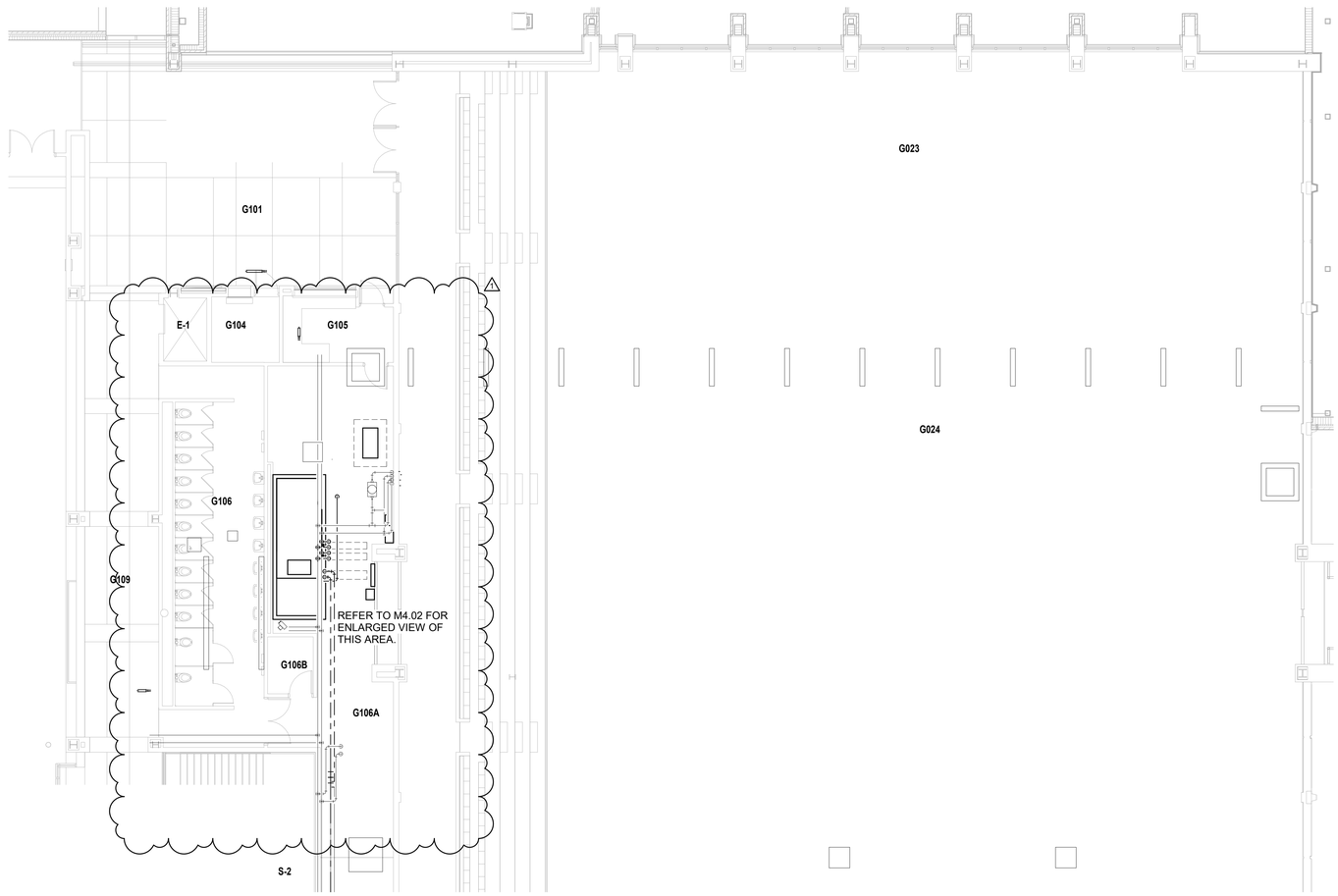
ROOM LEGEND - FIRST FLOOR UNIT G1		
ROOM NO.	ROOM NAME	AREA (SF)
E-1	ELEVATOR	50 SF
G101	LOBBY	1590 SF
G102	SEATING CROSS AISLE	1669 SF
G103	POOL SEATING	2418 SF
G104	TICKETS	79 SF
G105	CONCESSIONS	130 SF
G106	WOMEN'S RESTROOM	612 SF
G106A	MECHANICAL	871 SF
G106B	TECHNOLOGY	46 SF
G109	CORRIDOR	1668 SF



UNIT G1 - FIRST FLOOR HVAC PIPING PLAN

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

HVAC PIPING PLAN GENERAL NOTES

A. ALL PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OPSTRUCTIONS.
D. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
E. HYDRONIC SUPPLY AND RETURN PIPING SHALL BE THE SAME SIZE UNLESS OTHERWISE NOTED.

HVAC PIPING PLAN NOTES (X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION

VERIFICATION NOTE

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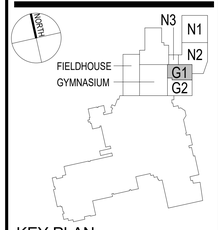

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR PIPING PLAN - UNIT G1

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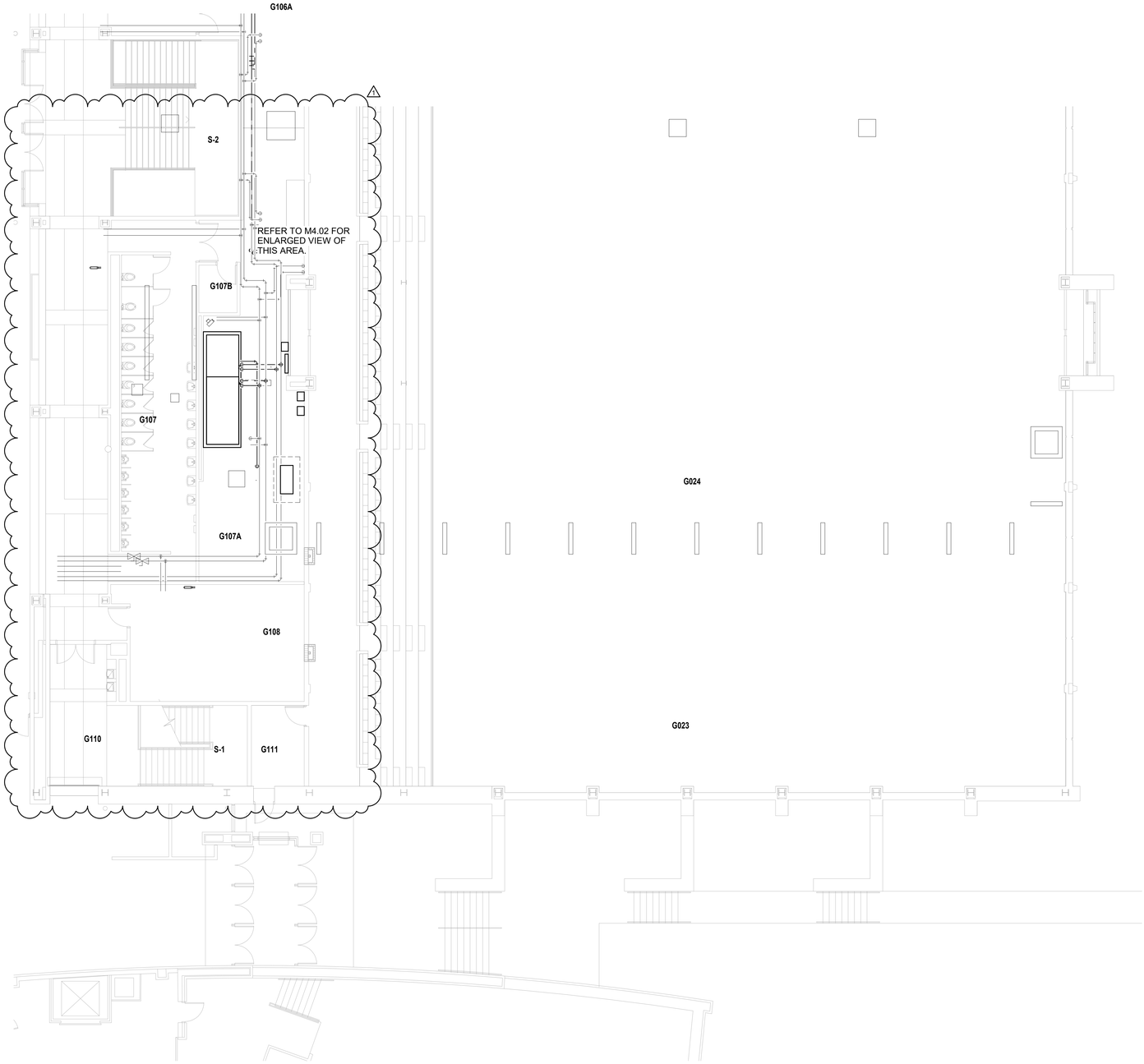
ROOM LEGEND - FIRST FLOOR UNIT G2		
ROOM NO.	ROOM NAME	AREA (SF)
G107	MEN'S RESTROOM	691 SF
G107A	MECHANICAL	980 SF
G107B	ELECTRICAL	46 SF
G108	TEAM ROOM	522 SF
G110	PASSAGE	281 SF
G111	VESTIBULE	108 SF
S-1	STAIR	231 SF
S-2	STAIR	529 SF



UNIT G2 - FIRST FLOOR HVAC PIPING PLAN

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

HVAC PIPING PLAN GENERAL NOTES

A. ALL PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OPSTRUCTIONS.
D. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
E. HYDRONIC SUPPLY AND RETURN PIPING SHALL BE THE SAME SIZE UNLESS OTHERWISE NOTED.

HVAC PIPING PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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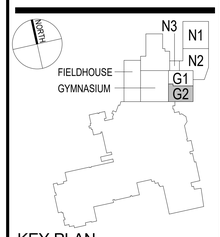
350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204



KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

FIRST FLOOR PIPING PLAN - UNIT G2

M3.10

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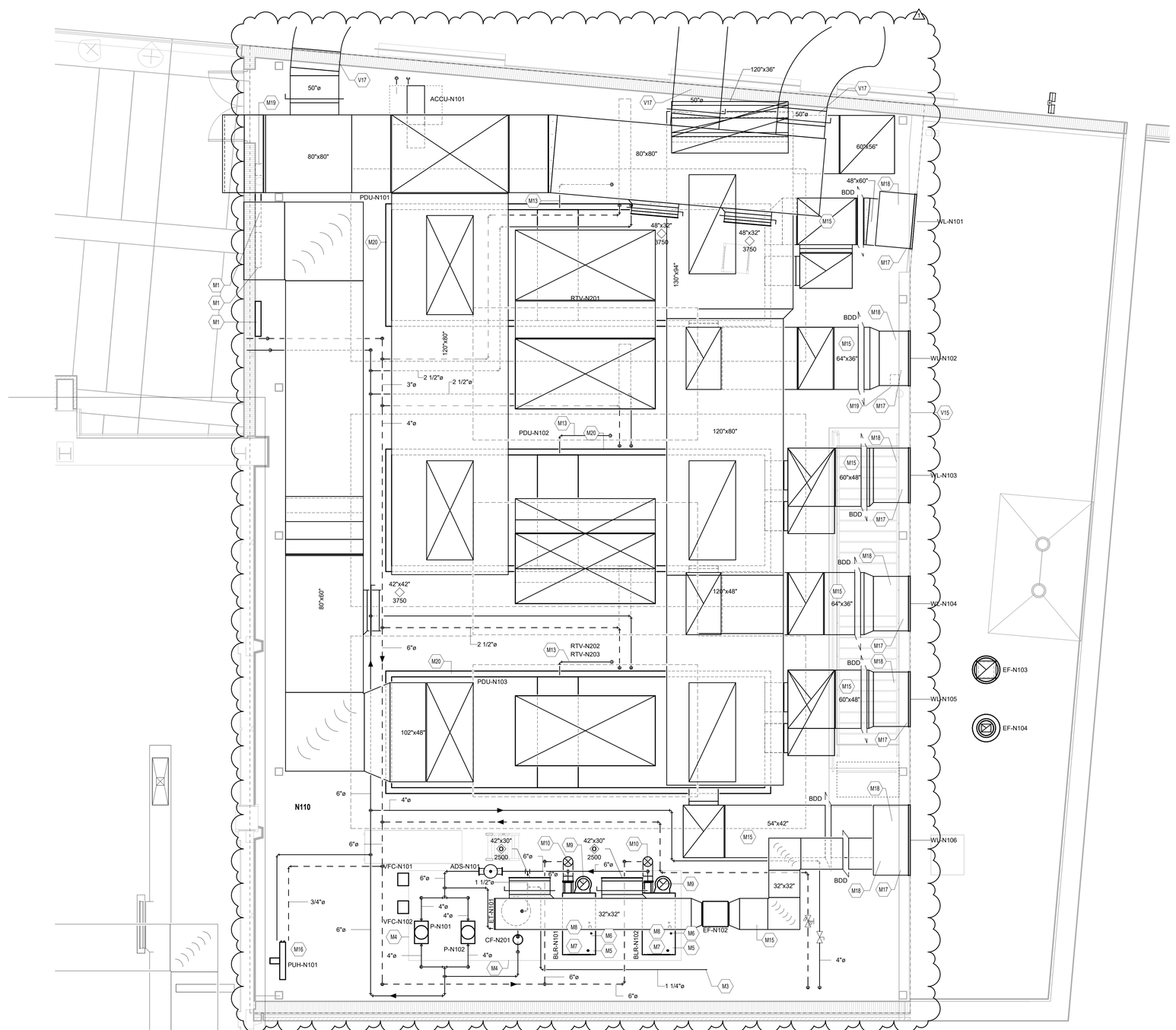

FIRST FLOOR MECHANICAL ROOM PLAN - UNIT N

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

MECHANICAL ROOM PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.
M. HYDRONIC SUPPLY AND RETURN PIPING SHALL BE THE SAME SIZE UNLESS OTHERWISE NOTED.

MECHANICAL ROOM PLAN NOTES (X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
M1	APPROXIMATE LOCATION OF POOL DEHUMIDIFICATION UNIT CONTROL PANEL. COORDINATE LOCATION WITH ALL TRADES.
M3	CONNECTION POINT FOR COLD WATER MAKE-UP TO HEATING WATER SYSTEM. DIVISION 22 PLUMBING CONTRACTOR SHALL PIPE TO THIS POINT COMPLETE WITH BACKFLOW PREVENTER. DIVISION 23 MECHANICAL CONTRACTOR TO PIPE TO EXPANSION TANK VALVING. REFER TO DETAIL.
M4	INSTALL EQUIPMENT ON 3-1/2" HIGH CONCRETE HOUSEKEEPING PAD.
M5	NATURAL GAS TRAIN APPROVED BY FACTORY MUTUAL (FM). DIVISION 22 PLUMBING CONTRACTOR TO INSTALL NATURAL GAS PIPING TO END OF GAS TRAIN. REFER TO DETAIL.
M6	CONDENSATE DRAIN WITH TRAP PIPED FROM BOILER TO FLOOR DRAIN FULL SIZE. EACH BOILER TO BE PROVIDED WITH INDEPENDENT ACID NEUTRALIZATION BASIN. REFER TO DETAIL.
M7	DRAIN PIPING WITH SHUT-OFF VALVE FROM BOILER TO FLOOR DRAIN. PIPE FULL SIZE TO FLOOR DRAIN.
M8	PRESSURE RELIEF VALVE. REFER TO BOILER MANUFACTURER FOR RECOMMENDED LOCATION. PIPE FULL SIZE TO FLOOR DRAIN. SUPPORT PIPING INDEPENDENTLY OF VALVE TO PREVENT STRESS ON VALVE AND TO ALLOW PROPER OPERATION.
M9	12" DIAMETER TYPE "AL-29-4C" FLUE PIPE SYSTEM UP FROM BOILER FLUE CONNECTION. ROUTE FLUE THROUGH ROOF WITH AN APPROVED THIMBLE AND TERMINATE A MINIMUM OF 96" ABOVE ROOF WITHIN A 10'-0" RADIUS OF FLUE WITH AN APPROVED RAIN CAP. CONFIRM FLUE SIZE WITH BOILER MANUFACTURER. SUPPORT FLUE FROM BUILDING STRUCTURE.
M10	10" DIAMETER SINGLE WALL INSULATED METAL PIPE FROM BOILER INLET CONNECTION UP THROUGH ROOF WITH A CURB AND AN APPROVED THIMBLE AND TERMINATE A MINIMUM OF 48" ABOVE ROOF WITHIN A 10'-0" RADIUS OF FLUE WITH AN APPROVED RAIN CAP. CONFIRM VENT SIZE WITH BOILER MANUFACTURER. SUPPORT VENT FROM BUILDING STRUCTURE.
M13	LINE SIZE INSULATED COPPER CONDENSATE TRAP TO O.S.D. COORDINATE EXACT LOCATION WITH ALL TRADES. REFER TO DETAIL.
M15	WRAP EXHAUST DUCTWORK WITH INSULATION FROM EXHAUST FAN TO ROOFTOP VENTILATOR OR WALL LOUVER.
M16	SUPPORT UNIT HEATER FROM STRUCTURE ABOVE OR ADJACENT WALL WITH SUPPLEMENTAL STEEL AND THREADED ROD WITH VIBRATION ISOLATORS. MOUNT BOTTOM OF UNIT AT 9'-0" AFF. REFER TO PROJECT MANUAL 238239.
M17	INSTALL DRIP PAN UNDER WALL LOUVER. PAN SHALL BE SEALED WATER-TIGHT. DRIP PAN TO EXTEND A MINIMUM OF 6 INCHES BEYOND DUCT.
M18	INSULATED SHEET METAL PLENUM MOUNTED BEHIND WALL LOUVER. TRANSITION BOTTOM OF DUCT AT A SLOPE DOWNWARD TO WALL LOUVER. SEAL ALL SEAMS AND EDGES WATER TIGHT. WRAP PLENUM WITH INSULATION. REFER TO DETAIL.
M19	EMERGERNCY BOILER SHUT-DOWN SWITCH PROVIDED AND INSTALLED BY TEMPERATURE CONTROL CONTRACTOR.
M20	INSTALL EQUIPMENT ON 6" HIGH CONCRETE HOUSEKEEPING PAD.
V15	ALL DUCTWORK WITHIN THE DASHED LINES SHALL BE ALUMINUM OR STAINLESS STEEL. REFER TO SPECIFICATIONS.
V17	TRANSITION TO FABRIC DUCTWORK AT THIS APPROXIMATE LOCATION. FABRIC DUCTWORK TO BE MOUNTED IN A FASHION WHERE DUCTWORK DOES NOT TOUCH STEEL OR ANY OTHER BUILDING COMPONENT WHILE INFLATED OR DEFLATED. INSTALL FABRIC DUCTWORK WITH A 1-ROW CABLE SYSTEM. COORDINATE EXACT LOCATION WITH ALL OTHER TRADES. CUSTOM COLOR TO BE SELECTED BY THE ARCHITECT/ENGINEER. REFER TO DETAILS AND SPECIFICATIONS.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

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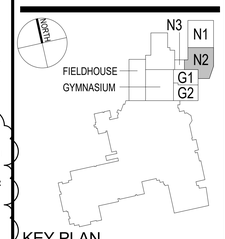

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOOF REGISTERED No. PE 12200301 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL ROOM ENLARGED PLAN

M4.01

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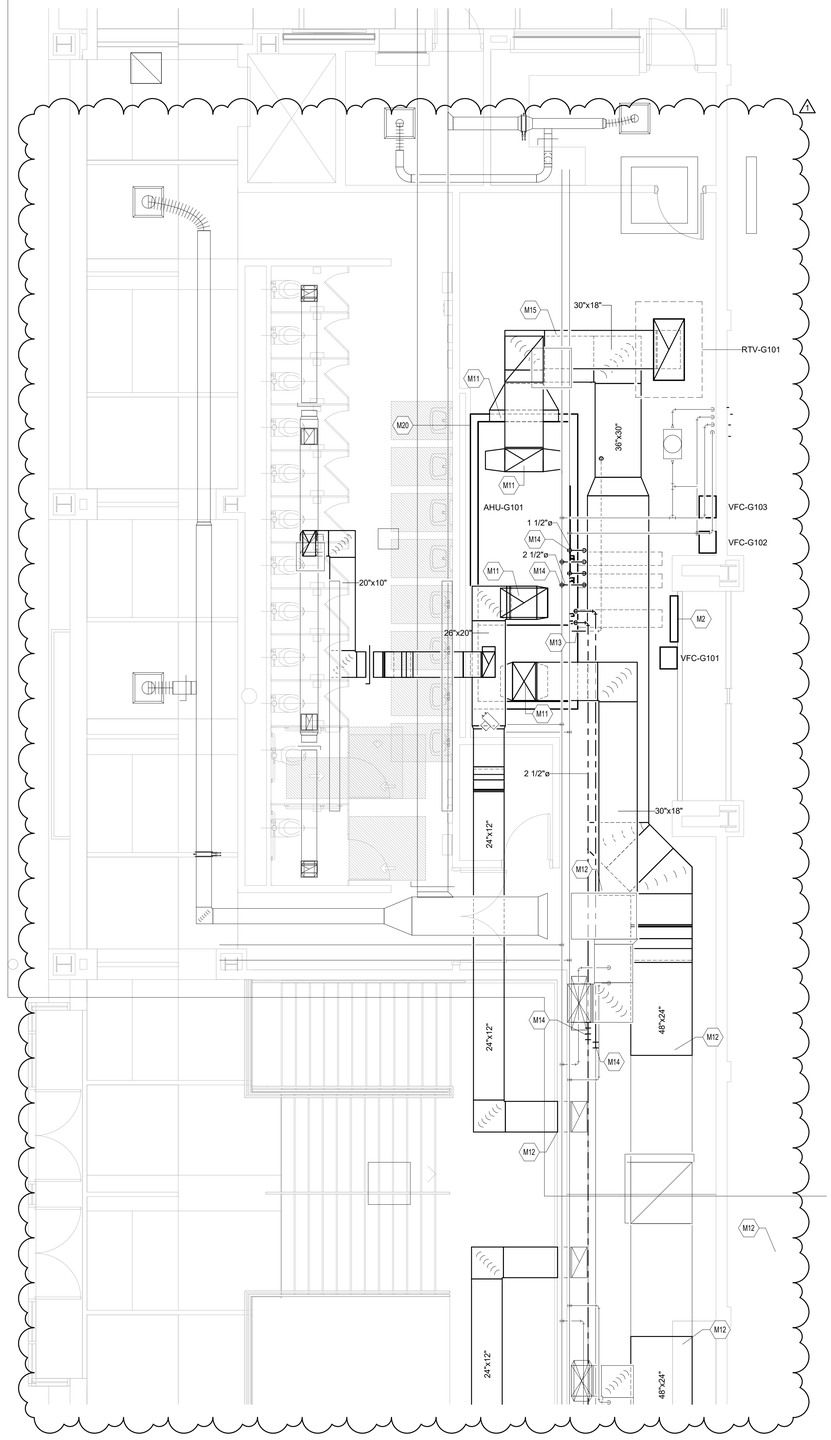

FIRST FLOOR MECHANICAL ROOM PLAN - UNIT G1

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

MECHANICAL ROOM PLAN GENERAL NOTES

A. ALL DUCTWORK, PIPING AND VALVES SHALL BE CONCEALED ABOVE THE CEILING AND WITHIN WALLS, UNLESS OTHERWISE NOTED.
B. REFER TO THE SPECIFICATIONS FOR REQUIREMENTS RELATED TO EQUIPMENT QUALITY, CONSTRUCTION AND FINISH OF MATERIALS.
C. ARRANGE DUCTWORK, PIPING, ETC. TO ALLOW FOR EASY ACCESS TO COILS, VALVES, DAMPERS AND CONTROLS. KEEP AREAS ADJACENT TO ACCESS PANELS FREE AND CLEAR OF ANY OBSTRUCTIONS.
D. SEAL DUCT PENETRATIONS THROUGH THE FLOOR AND/OR WALLS IN ACCORDANCE WITH MECHANICAL CODE AND SMACNA REQUIREMENTS. SEAL DUCT PENETRATIONS THROUGH FIRE RATED FLOORS AND/OR WALLS WITH A MATERIAL HAVING SAME FIRE RATING AS THE WALL AND/OR FLOOR.
E. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR HIS RESPECTIVE WORK FOR REPAIRING AND PATCHING TO MATCH EXISTING SURFACES, SIDEWALKS, STREETS, FLOORS, WALLS, ROOFS, CEILING AND PAVEMENT.
F. ALL RECTANGULAR SHEET METAL DUCT SIZES SHOWN ARE INSIDE FREE AREA DIMENSIONS. ALL ROUND DUCT SIZES SHOWN ARE INSIDE DIAMETERS.
G. PROVIDE BALANCING DAMPER AT EACH DUCT BRANCH, SERVING DIFFUSER, GRILLE AND REGISTER.
H. INSTALL WALL THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, ETC. 44" ABOVE THE FINISH FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS.
I. COORDINATE ALL REQUIRED WALL, ROOF AND FLOOR OPENINGS (BOTH DIMENSIONS AND LOCATIONS) WITH ALL OTHER TRADES.
J. COORDINATE MECHANICAL SYSTEM INSTALLATION WITH STRUCTURE, FIRE PROTECTION AND LIGHTING LAYOUT.
K. PROVIDE ALL NECESSARY TRANSITIONS TO EQUIPMENT FROM SIZES SHOWN ON PLAN.
L. ALL RETURN/EXHAUST AIR DUCT ABOVE LOCKERS/SHOWER AREAS SHALL BE MADE OF ALUMINUM IN ACCORDANCE WITH SMACNA REQUIREMENTS.
M. HYDRONIC SUPPLY AND RETURN PIPING SHALL BE THE SAME SIZE UNLESS OTHERWISE NOTED.

MECHANICAL ROOM PLAN NOTES (X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

NO.	DESCRIPTION
M2	APPROXIMATE LOCATION OF AIR HANDLING UNIT CONTROL PANEL. COORDINATE LOCATION WITH ALL TRADES.
M11	TRANSITION DUCTWORK AS REQUIRED TO MAKE FINAL CONNECTION TO AIR HANDLING UNIT.
M12	CONNECT TO EXISTING DUCTWORK. MAKE ADJUSTMENTS AS NECESSARY.
M13	LINE SIZE INSULATED COPPER CONDENSATE TRAP TO O.S.D. COORDINATE EXACT LOCATION WITH ALL TRADES. REFER TO DETAIL.
M14	CONNECT TO EXISTING PIPING. MAKE ADJUSTMENTS AS NECESSARY.
M15	WRAP EXHAUST DUCTWORK WITH INSULATION FROM EXHAUST FAN TO ROOFTOP VENTILATOR OR WALL LOUVER.
M20	INSTALL EQUIPMENT ON 6" HIGH CONCRETE HOUSEKEEPING PAD.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

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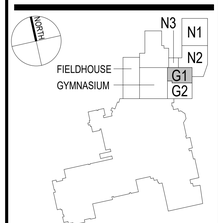

KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOOF REGISTERED No. PE 12909001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL ROOM

M4.02

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POOL DEHUMIDIFICATION UNIT SCHEDULE

TAG	AIR HANDLER TYPE	ELECTRICAL			SUPPLY FAN						EXHAUST FAN					PURGE FAN					ENERGY RECOVERY						COOLING									REHEAT COIL		GAS FIRED HEATING				CONDENSER PUMP		EA FILTER	RA FILTER	SA FILTER	MANUFACTURER	MODEL NO.	NOTES
		MCA	MOP	SERVICE	SA	OA	TYPE	SIZE	ESP	HP	EA	TYPE	SIZE	ESP	HP	EA	TYPE	SIZE	ESP	HP	TYPE	PROP. GLYCOL	OA COIL	EA COIL	PUMPS	HP	TOTAL MBH	SENS. MBH	AC TOTAL MBH	AC SENS. MBH	LATENT LB/HR	COMP.	CIRCUITS	REFRIG	MBH	MODULATION	INPUT	OUTPUT	EAT	LAT	PUMPS	HP						
PDU-G201	POOL DEHUMIDIFICATION	156	175	460/60/3	20,000	4,060	PLENUM	-	1.5"	(2)20	4,466	PLENUM	-	1.5"	(2) 3.9	17,534	AXIAL	-	0.0"	(2) 5.3	RUNAROUND	33%	4-ROW	4-ROW	1	0.75	723.7	418.6	743.3	419.3	300.0	2	2	R-410A	904.6	FULL	800	640	64.3	101.3	1	1.75	MERV 8	MERV 13	MERV 13	POOL PAK	PPK-220	1,2,3,4,5,6,7,8
PDU-G202	POOL DEHUMIDIFICATION	156	175	460/60/3	20,000	4,060	PLENUM	-	1.5"	(2)20	4,466	PLENUM	-	1.5"	(2) 3.9	17,534	AXIAL	-	0.0"	(2) 5.3	RUNAROUND	33%	4-ROW	4-ROW	1	0.75	723.7	418.6	743.3	419.3	300.0	2	2	R-410A	904.6	FULL	800	640	64.3	101.3	1	1.75	MERV 8	MERV 13	MERV 13	POOL PAK	PPK-220	1,2,3,4,5,6,7,8
PDU-G203	POOL DEHUMIDIFICATION	156	175	460/60/3	20,000	4,060	PLENUM	-	1.5"	(2)20	4,466	PLENUM	-	1.5"	(2) 3.9	17,534	AXIAL	-	0.0"	(2) 5.3	RUNAROUND	33%	4-ROW	4-ROW	1	0.75	723.7	418.6	743.3	419.3	300.0	2	2	R-410A	904.6	FULL	800	640	64.3	101.3	1	1.75	MERV 8	MERV 13	MERV 13	POOL PAK	PPK-220	1,2,3,4,5,6,7,8

NOTES

1. DESIGN CRITERIA
   SUMMER OUTDOOR: 95°F DB/75°F WB SUMMER INDOOR: 85°F
   WINTER OUTDOOR: 0°F WINTER INDOOR: 85°F
   DESIGN RELATIVE HUMIDITY INDOOR 60%
2. REFER TO SPECIFICATION SECTIONS 23 73 15 FOR ADDITIONAL PRODUCT AND INSTALLATION DETAILS.
3. UNIT SHALL HAVE FACTORY MOUNTED CONTROLS WITH LCD DISPLAY. COORDINATE WITH TCC.
4. SINGLE POINT POWER WITH NON-FUSED FACTORY MOUNTED DISCONNECT, WITH INDIVIDUAL FUSES ON CIRCUIT BREAKERS FOR EACH BRANCH CIRCUIT.
5. THE REMOTE FLUID COOLER REQUIRES A SEPARATE ELECTRICAL FEED AND ELECTRICAL DISCONNECT SWITCH. MANUFACTURER TO SUPPLY DISCONNECT.
7. UNIT PROVIDED WITH FACTORY MOUNTED OUTSIDE AIR AND RETURN AIR CONTROL DAMPERS.
8. UNIT PROVIDED WITH BACNET COMMUNICATION. COORDINATE WITH TCC.

POOL DEHUMIDIFICATION UNIT SCHEDULE

TAG	AIR HANDLER TYPE	ELECTRICAL			SUPPLY FAN						EXHAUST FAN					PURGE FAN					ENERGY RECOVERY						COOLING									REHEAT COIL		HOT WATER AUXILIARY HEATING (140°F EWT)						CONDENSER PUMP		EA FILTER	RA FILTER	SA FILTER	MANUFACTURER	MODEL NO.	NOTES
		MCA	MOP	SERVICE	SA	OA	TYPE	SIZE	ESP	HP	EA	TYPE	SIZE	ESP	HP	EA	TYPE	SIZE	ESP	HP	TYPE	PROP. GLYCOL	OA COIL	EA COIL	PUMPS	HP	TOTAL MBH	SENS. MBH	AC TOTAL MBH	AC SENS. MBH	LATENT LB/HR	COMP.	CIRCUITS	REFRIG	MBH	MODULATION	MBH	EAT	LAT	LWT	GPM	FLUID PRESSURE DROP (FT.)		PROP. GLYCOL	PUMPS	HP						
PDU-N101	POOL DEHUMIDIFICATION	217	250	460/60/3	38,666	6,667	PLENUM	-	1.5"	(1)20 ,(1)25	7,333	PLENUM	-	0.5"	(2) 3.9	33,732	AXIAL	-	0.75"	(4) 5.3	RUNAROUND	33%	4-ROW	4-ROW	1	0.75	1063.1	607.7	1063.1	607.7	421.6	2	2	R-410A	1328.9	FULL	680.0	82	101.5	120	74.6	10.2		35%	1	2.125	MERV 8	MERV 13	MERV 13	POOL PAK	PPK-340	1,2,3,4,5,6,7,8
PDU-N102	POOL DEHUMIDIFICATION	217	250	460/60/3	38,666	6,667	PLENUM	-	1.5"	(1)20 ,(1)25	7,333	PLENUM	-	0.5"	(2) 3.9	33,732	AXIAL	-	0.75"	(4) 5.3	RUNAROUND	33%	4-ROW	4-ROW	1	0.75	1063.1	607.7	1063.1	607.7	421.6	2	2	R-410A	1328.9	FULL	680.0	82	101.5	120	74.6	10.2		35%	1	2.125	MERV 8	MERV 13	MERV 13	POOL PAK	PPK-340	1,2,3,4,5,6,7,8
PDU-N103	POOL DEHUMIDIFICATION	217	250	460/60/3	38,666	6,667	PLENUM	-	1.5"	(1)20 ,(1)25	7,333	PLENUM	-	0.5"	(2) 3.9	33,732	AXIAL	-	0.75"	(4) 5.3	RUNAROUND	33%	4-ROW	4-ROW	1	0.75	1063.1	607.7	1063.1	607.7	421.6	2	2	R-410A	1328.9	FULL	680.0	82	101.5	120	74.6	10.2		35%	1	2.125	MERV 8	MERV 13	MERV 13	POOL PAK	PPK-340	1,2,3,4,5,6,7,8

NOTES

1. DESIGN CRITERIA
   SUMMER OUTDOOR: 95°F DB/75°F WB SUMMER INDOOR: 85°F
   WINTER OUTDOOR: 0°F WINTER INDOOR: 85°F
   DESIGN RELATIVE HUMIDITY INDOOR 60%
2. REFER TO SPECIFICATION SECTIONS 23 73 15 FOR ADDITIONAL PRODUCT AND INSTALLATION DETAILS.
3. UNIT SHALL HAVE FACTORY MOUNTED CONTROLS WITH LCD DISPLAY. COORDINATE WITH TCC.
4. SINGLE POINT POWER WITH NON-FUSED FACTORY MOUNTED DISCONNECT, WITH INDIVIDUAL FUSES ON CIRCUIT BREAKERS FOR EACH BRANCH CIRCUIT.
5. THE REMOTE FLUID COOLER REQUIRES A SEPARATE ELECTRICAL FEED AND ELECTRICAL DISCONNECT SWITCH. MANUFACTURER TO SUPPLY DISCONNECT.
7. UNIT PROVIDED WITH FACTORY MOUNTED OUTSIDE AIR AND RETURN AIR CONTROL DAMPERS.
8. UNIT PROVIDED WITH BACNET COMMUNICATION. COORDINATE WITH TCC.

AIR HANDLING/HEAT RECOVERY UNIT SCHEDULE

MARK	FANS													HEAT WHEEL														COILS														NOTES
	SUPPLY							EXHAUST						SUPPLY						EXHAUST						HEAT WHEEL			COOLING COIL (EWT 42°)						HEATING COIL (EWT 180°)							
	CFM	MINIMUM O.A. CFM	EXT. S.P.	TOTAL S.P.	HP	TYPE	ELEC.	CFM	EXT. S.P.	TOTAL S.P.	HP	TYPE	ELEC.	CFM IN	CFM OUT	SUMMER EAT	SUMMER LAT	WINTER EAT	WINTER LAT	CFM IN	CFM OUT	SUMMER EAT	SUMMER LAT	WINTER EAT	WINTER LAT	PURGE	H.P.	ELEC.	EAT	LAT	COOLING LOAD SENS.	COOLING LOAD TOTAL	GPM	LWT	WPD	APD	EAT	LAT	MBH	GPM	LWT	WPD	APD	
AHU-G101	6,700	6,700	4.50	4.83	10.0	DIRECT	460/3	3,085	1.25	2.33	2.0	DIRECT	460/3	7,021	6,700	91.3 / 75.0	84.3 / 70.0	2.60 / 0.00	41.5 / 36.1	2,850	3,171	75.0 / 62.5	89.1 / 73.6	104.3 / 70.3	15.7 / 13.7	321	1/4	460/3	84.3 / 70.0	55.0 / 54.6	216.9	331.7	47.2	56.0	3.77	0.47	41.5	93.6	379.0	37.9	160.0	0.69	0.098	1,2,3,4,5,6,7,8,9,10
AHU-G102	3,910	3,910	1.50	5.00	5	DIRECT	460/3	3,554	1.25	2.75	3	DIRECT	460/3	4,087	3,910	91.3 / 75.0	80.6 / 67.4	2.60 / 0.00	46.1 / 42.8	3,400	3,577	75.0 / 62.5	86.7 / 71.6	72.0 / 60.1	23.1 / 22.9	177	1/6	460/3	80.6 / 67.4	55.0 / 54.6	110.1	155.7	22.2	56.0	1.73	0.44	46.1	85.0	164.9	16.5	160.0	0.93	0.067	1,2,3,4,5,6,7,8,9,10

1. MAXIMUM COOLING COIL FACE VELOCITY SHALL BE 500 FPM.
2. REFER TO SPECIFICATION SECTION 237313.
3. MAXIMUM HEATING COIL FACE VELOCITY SHALL BE 500 FPM.
4. MAXIMUM FILTER FACE VELOCITY SHALL BE 500 FPM.
5. REFER TO PLANS & SCHEMATIC SHEETS FOR UNIT LAYOUT DETAILS.
6. VARIABLE FREQUENCY CONTROLLER (VFC) SHALL BE PROVIDED ON SUPPLY FAN, EXHAUST FAN, AND ENERGY RECOVERY WHEEL.
7. PROVIDE CONVENIENCE OUTLET AND LIGHTS ON A SEPARATE CIRCUIT.
8. TOTAL STATIC PRESSURE REFLECTS AVERAGE DIRTY FILTERS.
9. UNIT SHALL INCLUDE BYPASS DAMPER AROUND HEAT WHEEL IN SUPPLY AIR STREAM AND EXHAUST AIR STREAM.
10. SUMMER:
    INDOOR: 74° db/50% RH
    OUTDOOR: 91.3° db/75.0° wb
    WINTER:
    INDOOR: 72.0° db
    OUTDOOR: 2.6° db

ROOFTOP AIR HANDLING UNIT SCHEDULE

MARK	FANS													HEAT WHEEL														COILS											NOTES
	SUPPLY							RELIEF/EXHAUST						SUPPLY						EXHAUST						HEAT WHEEL			DX COOLING COIL					HEATING GAS FURNACE					
	CFM	MINIMUM O.A. CFM	EXT. S.P.	TOTAL S.P.	HP	TYPE	ELEC.	CFM	EXT. S.P.	TOTAL S.P.	HP	TYPE	ELEC.	CFM IN	CFM OUT	SUMMER EAT	SUMMER LAT	WINTER EAT	WINTER LAT	CFM IN	CFM OUT	SUMMER EAT	SUMMER LAT	WINTER EAT	WINTER LAT	PURGE	H.P.	ELEC.	EAT	LAT	COOLING LOAD SENS.	COOLING LOAD TOTAL	APD	EAT	LAT	MBH INPUT	MBH OUTPUT	APD	
RTU-N101	15,500	6,200	1.50	3.61	7.5x2	PLENUM	460/3	13,950	0.50	-	8.0x2	IMPELLER	460/3	-	-	- -	- -	- -	- -	-	-	- -	- -	- -	- -	-	-	-	80.0 / 67.4	53.5 / 51.7	504.6	783.1	0.27	44.2	102.3	1200	972	0.67	1,2,3,4,5,7,9,10,11,13,14,15
RTU-N102	5,300	5,300	3.00	5.38	7.5	PLENUM	460/3	6,343	3.00	4.31	7.5	PLENUM	460/3	5,668	5,300	91.3 / 75.0	78.5 / 68.1	2.6 / 0.0	52.9 / 42.4	5,975	6,343	74.0 / 61.7	85.2 / 68.7	72.0 / 60.0	32.6 / 32.5	368	0.17	460/3	78.5 / 68.2	53.0 / 52.9	149.8	252.1	0.33	52.9	87.7	250	200	0.55	2,3,4,5,6,8,9,10,11,12,14,15
RTU-N103	7,700	2,500	3.00	4.62	10.0	PLENUM	460/3	7,700	3.00	-	7.5	PLENUM	460/3	-	-	- -	- -	- -	- -	-	-	- -	- -	- -	- -	-	-	-	78.6 / 66.6	53.4 / 53.0	222.9	317.2	0.36	49.5	83.0	350	280	0.40	1,2,3,4,5,7,9,10,11,12,14,15

1. SINGLE POINT ELECTRICAL CONNECTION TO UNITS.
2. REFER TO SPECIFICATION SECTION 237413.
3. TOTAL STATIC PRESSURE REFLECTS AVERAGE DIRTY FILTERS.
4. MAXIMUM FILTER FACE VELOCITY SHALL BE 500 FPM.
5. REFER TO PLANS & SCHEMATIC SHEETS FOR UNIT LAYOUT DETAILS.
6. VARIABLE FREQUENCY CONTROLLER (VFC) FOR THE SUPPLY FAN, EXHAUST FAN, AND ENERGY RECOVERY WHEEL SHALL BE PROVIDED BY AHU MANUFACTURER.
7. VARIABLE FREQUENCY CONTROLLER (VFC) FOR THE SUPPLY FAN AND RELIEF FAN SHALL BE PROVIDED BY THE AHU MANUFACTURER.
8. UNIT SHALL INCLUDE BYPASS DAMPER AROUND HEAT WHEEL IN SUPPLY AIR STREAM AND EXHAUST AIR STREAM.
9. PROVIDE CONVENIENCE OUTLET AND LIGHTS ON A SEPARATE CIRCUIT.
10. MAXIMUM COOLING COIL FACE VELOCITY SHALL BE 500 FPM.
11. UNIT TO BE PROVIDED WITH HOT GAS REHEAT COIL.
12. PROVIDE UNIT WITH DIGITAL SCROLL COMPRESSORS.
13. PROVIDE UNIT WITH VARIABLE SPEED COMPRESSORS.
14. WRAP COMPRESSORS WITH SOUND ATTENUATING BLANKETS.
15. SUMMER:
    INDOOR: 74° db/50% RH
    OUTDOOR: 91.3° db/75.0° wb
    WINTER:
    INDOOR: 72.0° db
    OUTDOOR: 2.6° db

DIFFUSER, REGISTER, AND GRILLE SCHEDULE

MARK	TYPE	EXAMPLE MANUFACTUER MODEL NO.	NECK SIZE	OVERALL SIZE L"xW"	MAX CORE/ NECK VEL.(FPM)	MAX. CFM	MAX. NOISE CRITERIA	FRAME/ MOUNTING	REMARKS
A	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	5"	12"x12"	800	100	21	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
B	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	6"	12"x12"	800	150	21	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
C	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	6"	24"x24"	800	150	20	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
D	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	8"	24"x24"	800	300	20	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
E	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	10"	24"x24"	800	425	20	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
F	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	12"	24"x24"	800	625	23	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
G	SQUARE PLAQUE CEILING DIFFUSER	TITUS OMNI	14"	24"x24"	700	750	20	REFER TO REFLECTED CEILING PLAN	4-WAY BLOW DIFFUSERS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
H	RETURN/AIR TRANSFER GRILLE	TITUS 355	-	8"x8"	600	225	20	REFER TO REFLECTED CEILING PLAN	PROVIDE ALUMINUM SURFACE MOUNT BORDER FOR DUCTED INSTALLATIONS.
I	RETURN/AIR TRANSFER GRILLE	TITUS 355	-	12"x12"	500	450	20	REFER TO REFLECTED CEILING PLAN	PROVIDE ALUMINUM SURFACE MOUNT BORDER FOR DUCTED INSTALLATIONS.
J	RETURN/AIR TRANSFER GRILLE	TITUS 355	-	14"x14"	500	600	20	REFER TO REFLECTED CEILING PLAN	PROVIDE ALUMINUM SURFACE MOUNT BORDER FOR DUCTED INSTALLATIONS.
K	RETURN/AIR TRANSFER GRILLE	TITUS 355	-	16"x16"	500	800	20	REFER TO REFLECTED CEILING PLAN	PROVIDE ALUMINUM SURFACE MOUNT BORDER FOR DUCTED INSTALLATIONS.
L	RETURN/AIR TRANSFER GRILLE	TITUS 355	-	18"x18"	500	1000	20	REFER TO REFLECTED CEILING PLAN	PROVIDE ALUMINUM SURFACE MOUNT BORDER FOR DUCTED INSTALLATIONS.
M	RETURN/AIR TRANSFER GRILLE	TITUS 355	-	22"x22"	500	1600	20	REFER TO REFLECTED CEILING PLAN	PROVIDE ALUMINUM SURFACE MOUNT BORDER FOR DUCTED INSTALLATIONS.
N	SIDEWALL-SUPPLY GRILLE	TITUS 300RL	-	SEE FLOOR PLANS FOR SIZE	500	PER PLANS	20	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	45 (DEGREE) DEFLECTION, UNLESS NOTED OTHERWISE ON FLOOR PLAN
O	SIDEWALL-RETURN GRILLE	TITUS 350FL	-	SEE FLOOR PLANS FOR SIZE	300	PER PLANS	20	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	FIXED 35 (DEGREE) DEFLECTION BLADES
P	HEAVY DUTY SUPPLY GRILLE	TITUS 300RL-HD	-	SEE FLOOR PLANS FOR SIZE	-	PER PLANS	20	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	———
Q	HEAVY DUTY RETURN GRILLE	TITUS 33RL	-	SEE FLOOR PLANS FOR SIZE	-	PER PLANS	20	REFER TO REFLECTED CEILING PLAN	FIXED 38 (DEGREE) DEFLECTION BLADES
R	ROUND CEILING DIFFUSER	TITUS TMR	12" DIA.	22"DIA.	500	PER PLANS	20	DUCT - W/SAFETY CHAIN REFER TO FLOOR PLAN	UNIFORM 360 DEGREE DISCHARGE, CUSTOM COLOR AS SELECTED BY A/E
S	SIDEWALL SUPPLY GRILLE	TITUS 300FL	-	SEE FLOOR PLANS FOR SIZE	500	PER PLANS	20	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	45 (DEGREE) DEFLECTION, UNLESS NOTED OTHERWISE ON FLOOR PLAN
T	LINEAR SLOT SUPPLY DIFFUSER	TITUS FBPI-30	12" DIA.	48" x 6-3/4"	800	550	15	REFER TO REFLECTED CEILING PLAN	JS WITH ENGINEERED PLENUM (CFP), 3" SLOT WIDTH, TOTAL OF 2 SLOTS.
U	LINEAR SLOT SUPPLY DIFFUSER	PRICE CUSTOM FLOW	12" DIA.	48" x 6-3/4"	800	650	18	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	JS WITH ENGINEERED PLENUM (CFP), 3" SLOT WIDTH, TOTAL OF 2 SLOTS.
V	HEAVY DUTY RETURN GRILLE	PRICE 97	-	32" x 12"	500	1,150	22	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	0 (DEGREE) DEFLECTION, UNLESS NOTED OTHERWISE ON FLOOR PLAN.
W	LINEAR SLOT SUPPLY DIFFUSER	PRICE CUSTOM FLOW	10" DIA.	48" x 6-3/4"	800	480	17	DUCT OR SIDEWALL: REFER TO FLOOR PLAN	JS WITH ENGINEERED PLENUM (CFP), 2" SLOT WIDTH, TOTAL OF 2 SLOTS.

CABINET/PROPELLER UNIT HEATER SCHEDULE

MARK	CFM	HP	HEATING 140° EWT						ELEC SERV	MODEL NO.	NOTES
			MBH	EAT	LAT	GPM	WPD	WTD			
CUH-N001	720	1/15	36.2	70.0	116.5	3.7	0.8	20.0	120/60/1	RFRC-420	1,2,3,6,9
CUH-N002	875	1/15	44.2	70.0	116.7	4.5	1.2	20.0	120/60/1	RFRC-420	1,2,3,6,9
CUH-N003	875	1/15	44.2	70.0	116.7	4.5	1.2	20.0	120/60/1	RFRC-420	1,2,3,6,9
PUH-N001	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N002	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N003	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N004	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N005	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N006	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N007	1240	1/8	32.8	70.0	94.3	3.3	0.1	20.0	120/60/1	RH-108	1,3,4,5,8,9,12
PUH-N008	490	1/15	10.3	70.0	89.3	1.2	0.1	17.2	120/60/1	RH-33	1,3,4,5,8,9,12
PUH-N101	1120	1/15	23.0	70.0	94.3	2.3	0.1	20.0	120/60/1	RH-63	1,3,4,5,8,9,12

NOTES:

1. STANDARD COLOR TO BE AS SPECIFIED BY ARCHITECT.
2. HORIZONTAL CEILING RECESSED UNIT.
3. REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.
4. VERTICAL WALL MOUNTED UNIT.
5. SUPPORT HEATER FROM STRUCTURE ABOVE WITH MINIMUM OF TWO (2), 3/8" DIAMETER THREADED RODS AND VIBRATION ISOLATORS.
6. SUPPORT HEATER FROM STRUCTURE ABOVE WITH MINIMUM OF FOUR (4), 3/8" DIAMETER THREADED RODS AND VIBRATION ISOLATORS.
7. UNIT CONCEALED ABOVE CEILING.
8. UNIT FURNISHED WITH ADJUSTABLE LOUVER FIN DIFFUSERS TO PROVIDE FOUR-DIRECTION AIR FLOW CONTROL.
9. UNIT TO BE PROVIDED WITH FACTORY MOUNTED DISCONNECT SWITCH.
10. ELECTRIC HEAT
11. OUTLET BOTTOM STAMPED LOUVER AND INLET BACK DUCT COLLAR.
12. MOUNT BOTTOM OF UNIT AT 9'-0" AFF

FLUID COOLER SCHEDULE

MARK	MBH	NOMINAL TONS	AMBIENT TEMP	MCA	MOP	SERVICE	NOTES
FC-N201	1,328.9	111	95	27	30	460/3/60	1,2,3,4,5
FC-N202	1,328.9	111	95	27	30	460/3/60	1,2,3,4,5
FC-N203	1,328.9	111	95	27	30	460/3/60	1,2,3,4,5
FC-G201	904.6	76	95	19	20	460/3/60	1,2,3,4,5
FC-G202	904.6	76	95	19	20	460/3/60	1,2,3,4,5
FC-G203	904.6	76	95	19	20	460/3/60	1,2,3,4,5

NOTES:

1. UNIT SHALL BE ROOF MOUNTED ON EQUIPMENT RAILS AND VIBRATION ISOLATORS.
2. REFER TO PROJECT MANUAL SECTION 23 62 00.
3. ALL INTERCONNECTIONS LOW VOLTAGE CABLING BETWEEN OUTDOOR AND INDOOR UNITS BY CONTRACTOR
4. MANUFACTURER TO PROVIDE NON-FUSED DISCONNECT SWITCH.
5. FLUID COOLERS SHALL BE PROVIDED BY POOL DEHUMIDIFICATION UNIT MANUFACTURER.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

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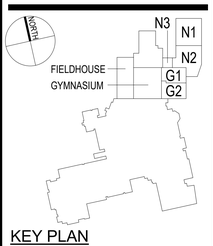

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL SCHEDULES

M5.01

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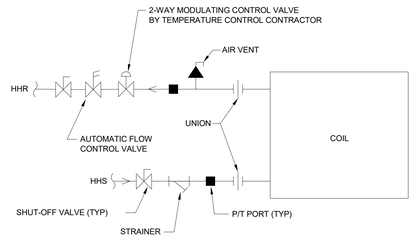
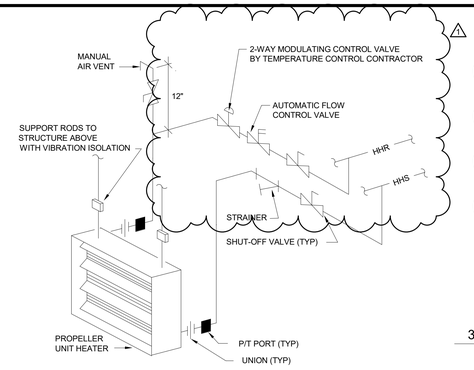


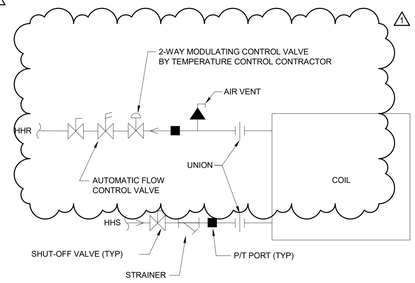
1 VVR COIL PIPING DIAGRAM

NO SCALE



2 PROPELLER UNIT HEATER PIPING DIAGRAM

NO SCALE



3 CABINET HEATER COIL PIPING DIAGRAM

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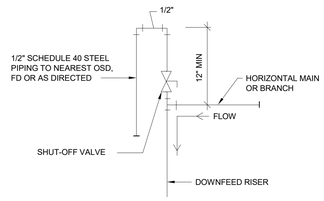

4 MANUAL AIR VENT DIAGRAM

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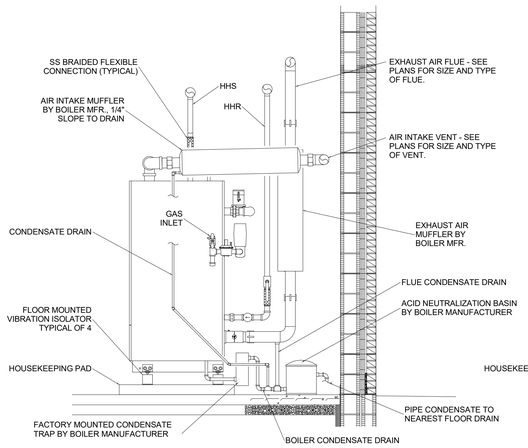
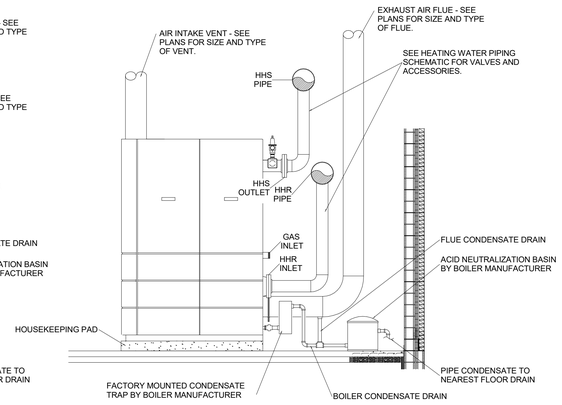


PULSE COMBUSTION TYPE BOILER ARRANGEMENT

NOTE:
REFER TO HEATING HOT WATER FLOW DIAGRAM FOR ACTUAL NUMBER OF
BOILERS THERMOMETERS, GAUGES, VALVES AND OTHER SPECIALTY FITTINGS.

5 HEATING HOT WATER PULSE CONDENSING BOILER INSTALLATION DETAIL (ELEVATION)

NO SCALE

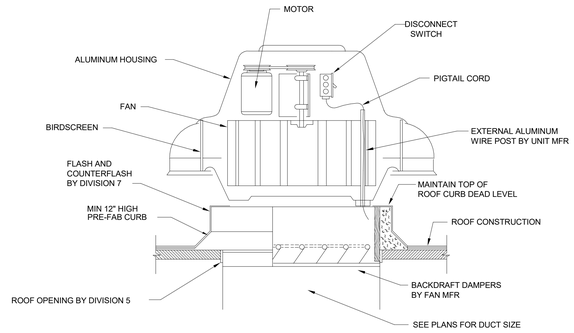


CONDENSING TYPE BOILER ARRANGEMENT

NOTE:
REFER TO HEATING HOT WATER FLOW DIAGRAM FOR ACTUAL NUMBER OF
BOILERS THERMOMETERS, GAUGES, VALVES AND OTHER SPECIALTY FITTINGS.

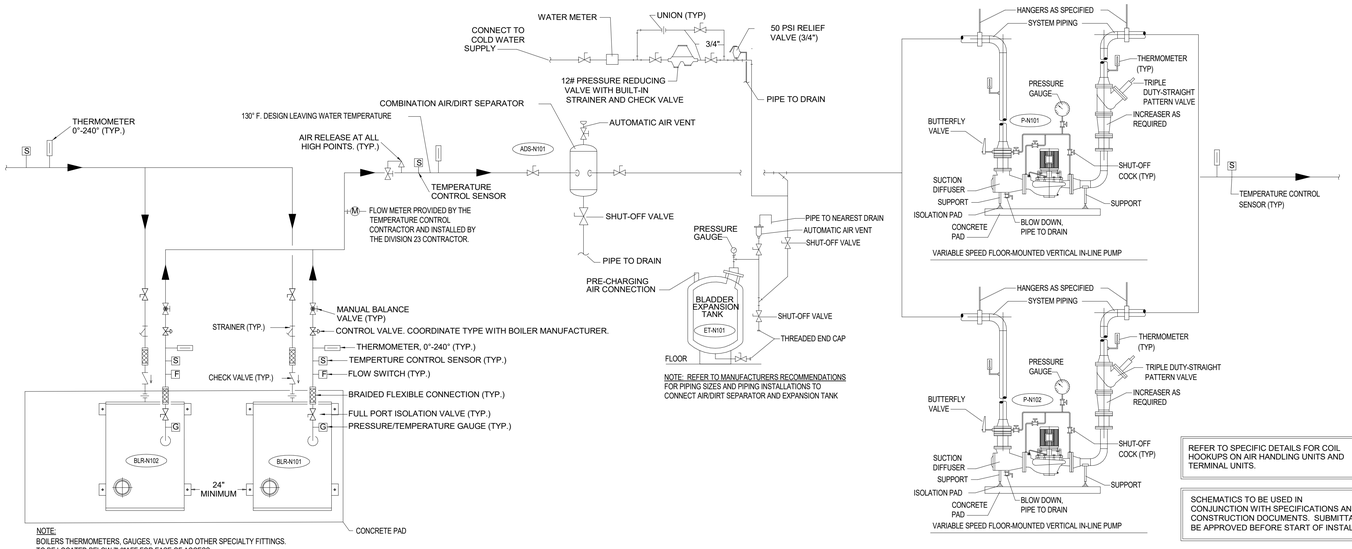
6 HEATING HOT WATER CONDENSING BOILER INSTALLATION DETAIL (ELEVATION)

NO SCALE



7 ROOF-MOUNTED EXHAUST FAN INSTALLATION DETAIL

NO SCALE

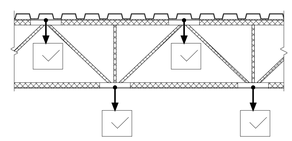


9 HEATING WATER PIPING SCHEMATIC

NO SCALE

REFER TO SPECIFIC DETAILS FOR COIL HOOKUPS ON AIR HANDLING UNITS AND TERMINAL UNITS.

SCHEMATICS TO BE USED IN CONJUNCTION WITH SPECIFICATIONS AND CONSTRUCTION DOCUMENTS. SUBMITTALS TO BE APPROVED BEFORE START OF INSTALLATION.



1. ALL LOADS IN EXCESS OF 100 LBS MAY ONLY BE HUNG FROM THE STEEL JOISTS AT THE LOCATIONS INDICATED WITH A CHECK MARK.

2. LOADS IN EXCESS OF 100 LBS ARE NOT TO BE HUNG FROM THE CROSS-HATCHED REGIONS UNLESS ADDITIONAL WEB REINFORCING MEMBERS ARE INSTALLED PER THE STRUCTURAL DRAWINGS.

3. THIS SECTION APPLIES TO LOADS HUNG FROM BOTH NEW JOISTS AND FROM EXISTING JOISTS.

4. SPACE HANGERS OUT SO THAT NOT ALL HANGERS ARE ATTACHED TO THE SAME JOIST.

ACCEPTABLE LOCATION TO HANG LOADS FROM STEEL JOISTS

8

NO SCALE

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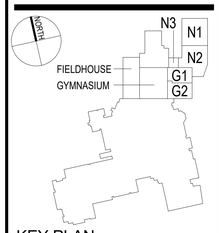

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL DETAILS

M5.04

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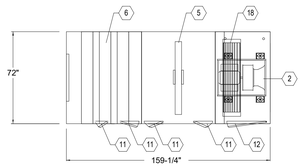
AHU NOTES:

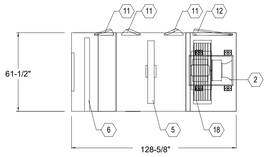
1. SUPPLY FAN
2. RELIEF/EXHAUST FAN
3. HEATING WATER COIL
4. CHILLED WATER COOLING COIL
5. ENERGY RECOVERY WHEEL
6. PRE-FILTER - MERV 8
7. PERFORATED INNER LINING (FAN SECTION)
8. RETURN AIR CONTROL DAMPER (FACTORY MOUNTED)
9. OUTSIDE AIR CONTROL DAMPER (FACTORY MOUNTED)
10. BASE RAIL
11. ACCESS DOOR
12. ACCESS DOOR W/ SERVICE WINDOW
13. CONDENSATE DRAIN
14. BY-PASS DAMPERS (FACTORY MOUNTED)
15. RUN-AROUND HEAT RECOVERY LOOP
16. PURGE EXHAUST FAN
17. 4" CARTRIDGE FILTER - MERV 13
18. EXHAUST AIR CONTROL DAMPER (FACTORY MOUNTED)
19. PRE-HEAT COIL

AIR HANDLING UNIT, POOL DEHUMIDIFICATION UNIT AND ROOFTOP UNITS TO BE PROVIDED WITH SERVICE LIGHTS IN EVERY ACCESS SECTION WITH WITH UNIT MOUNTED AND WIRED LIGHT SWITCH. UNIT MOUNTED AND WIRED SERVICE RECEPTACLE T TO BE PROVIDED WITH EACH UNIT. SHIPPING SPLITS SPLITS ARE AS REQUIRED BY UNIT MANUFACTURER.

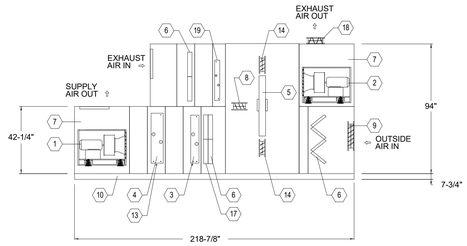


UPPER PLAN VIEW

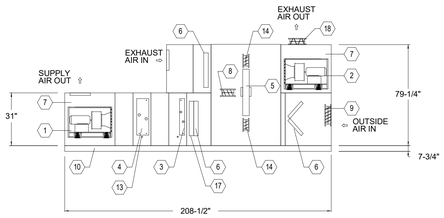
AIR HANDLING UNIT SHIPPING SPLITS SHALL BE COORDINATED WITH THE EXISTING BUILDING OPENINGS IN ORDER TO GET THE AIR HANDLING UNIT INSTALLED IN THE EXISTING MECHANICAL ROOM.



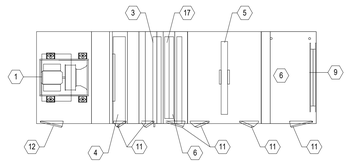
UPPER PLAN VIEW



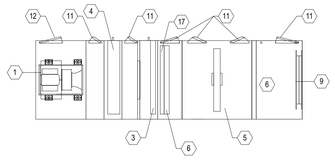
ELEVATION VIEW



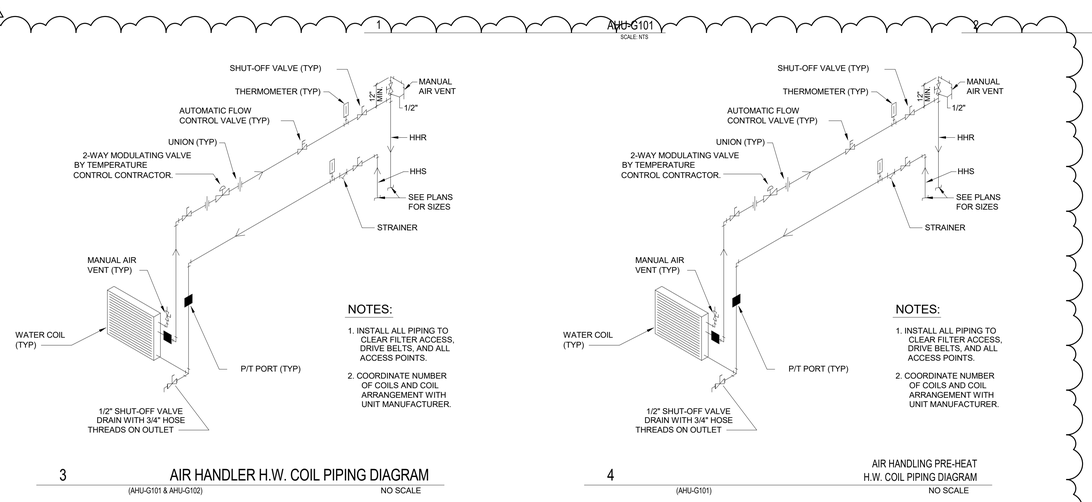
ELEVATION VIEW



LOWER PLAN VIEW

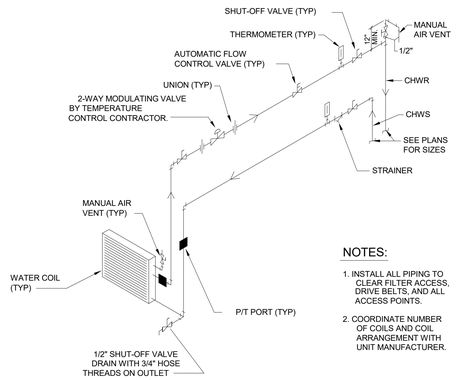


LOWER PLAN VIEW

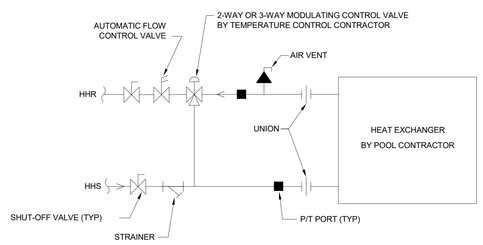


3 AIR HANDLER H.W. COIL PIPING DIAGRAM
(AHU-G101 & AHU-G102) NO SCALE

4 AIR HANDLING PRE-HEAT H.W. COIL PIPING DIAGRAM
(AHU-G101) NO SCALE



5 AIR HANDLER CH.W. COIL PIPING DIAGRAM
(AHU-G101 & AHU-G102) NO SCALE



6 POOL HEAT EXCHANGER PIPING DIAGRAM
NO SCALE

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CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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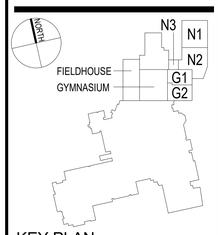
350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204



KEY PLAN

CONSTRUCTION DOCUMENTS

MARK Z. HOPF REGISTERED No. PE 12000001 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MZH

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01/25/2022

MECHANICAL DETAILS

M5.05

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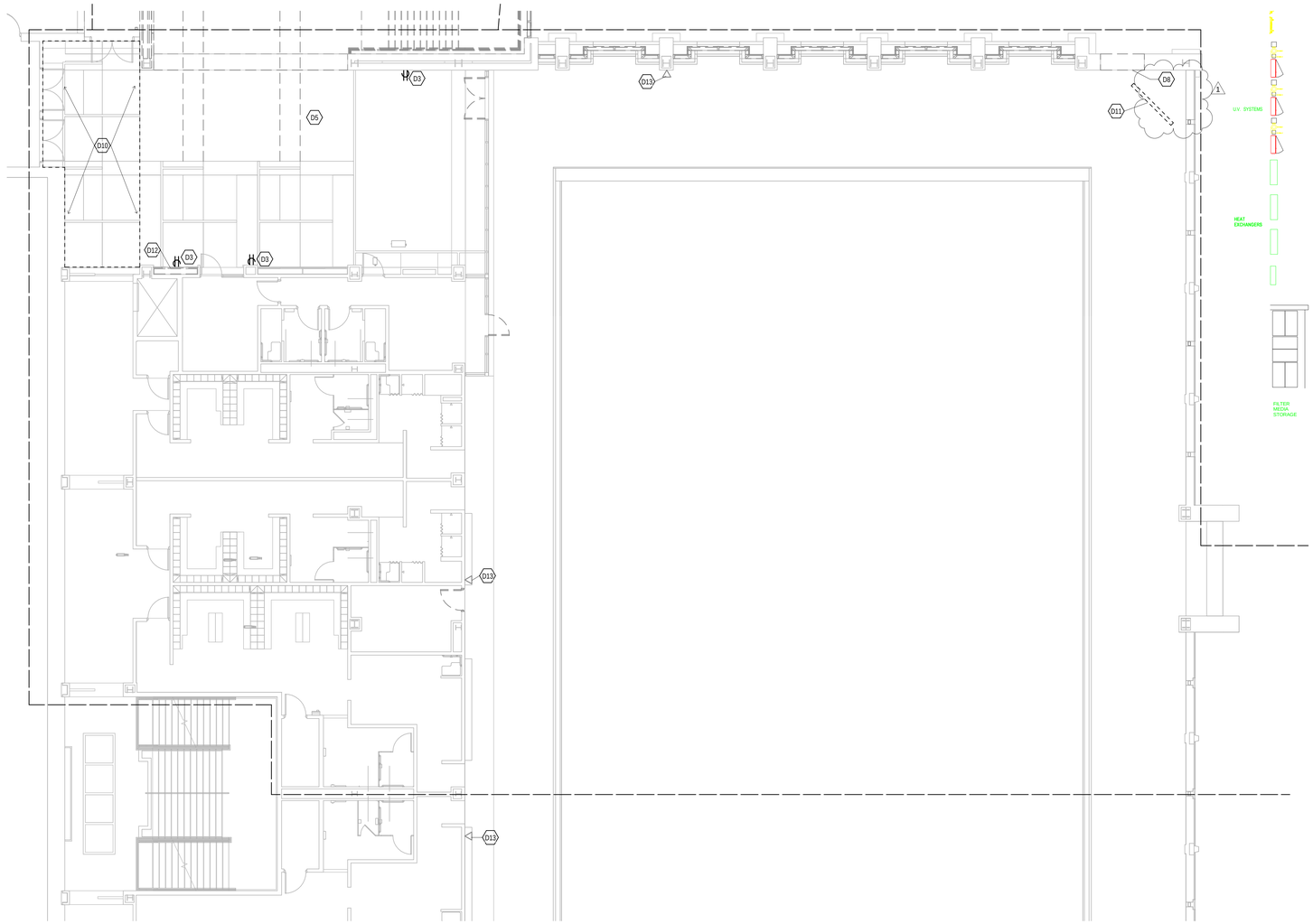
GENERAL NOTES - DEMOLITION

1. REFER TO ELECTRICAL SPECIFICATION SECTION 260005 "ELECTRICAL DEMOLITION" FOR ADDITIONAL REQUIREMENTS THAT APPLY TO THIS DRAWING SHEET.
2. REMOVE ELECTRICAL EQUIPMENT COMPLETE.

KEYNOTES	
D3	DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES.
D5	DISCONNECT AND REMOVE ALL EXISTING LIGHT FIXTURES AND LIGHT SWITCHES IN THIS ROOM. EXISTING LIGHTING CIRCUITS ARE TO REMAIN FOR THE NEW LIGHT FIXTURES.
D8	DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES AND FIRE ALARM DEVICES THAT ARE MOUNTED IN THE PORTION OF THE WALL THAT IS BEING REMOVED.
D10	EXISTING LIGHT FIXTURES IN THIS PORTION OF THE EXISTING CEILING TO REMAIN IN PLACE ARE ALSO TO REMAIN IN PLACE.
D11	DISCONNECT EXISTING SCOREBOARD AT THIS LOCATION.
D12	DISCONNECT AND REMOVE EXISTING LIGHT FIXTURE FROM DISPLAY CASE.
D13	DISCONNECT AND REMOVE EXISTING DATA JACK, DATA CABLING AND FACEPLATE AT THIS LOCATION. TELECOM CONTRACTOR TO DO THIS WORK.



UNIT G1 - LOWER LEVEL ELECTRICAL DEMOLITION PLAN

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

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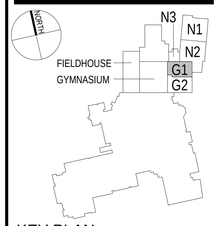

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT G1 - LOWER LEVEL ELECTRICAL DEMOLITION PLAN

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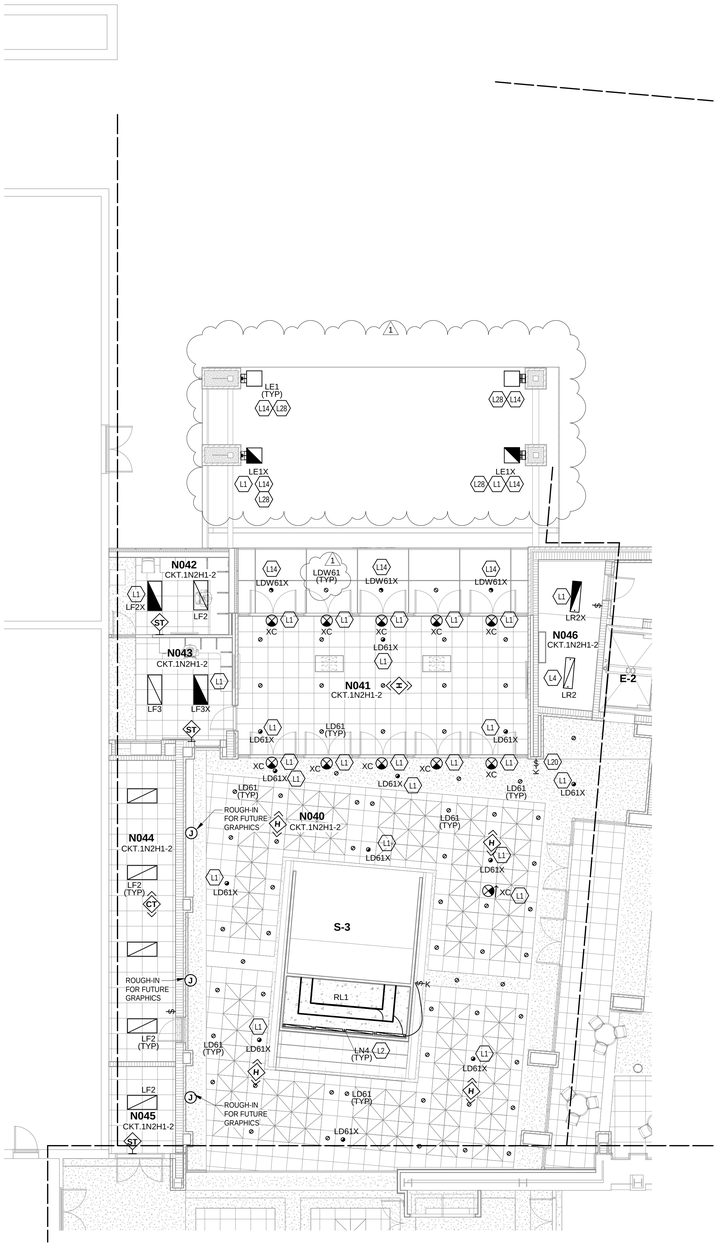
ROOM LEGEND - LOWER LEVEL UNIT N3		
ROOM NO.	ROOM NAME	AREA (SF)
E-2	ELEVATOR	84 SF
N026	LOWER CONCOURSE	8296 SF
N040	LOBBY	2390 SF
N041	VESTIBULE	701 SF
N042	SRO	157 SF
N043	RECEPTION	227 SF
N044	STORAGE	342 SF
N045	CUSTODIAL	99 SF
N046	ELEV. EQ.	156 SF
S-3	STAIR	235 SF

GENERAL NOTES - LIGHTING

1. FINAL CONNECTION TO RECESSED LUMINAIRES SHALL BE WITH FLEXIBLE METALLIC CONDUIT, MC CABLE OR MANUFACTURED WIRING SYSTEM.
2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATION OF LUMINAIRE. COORDINATE LOCATION OF LUMINAIRES, LOUDSPEAKERS, DIFFUSERS, GRILLES, AND OTHER CEILING INSTALLED ELEMENTS WITH THEIR RESPECTIVE INSTALLERS.
3. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND ROOM FINISH SCHEDULE TO DETERMINE PROPER TYPE OF LUMINAIRE TRIM REQUIRED FOR CEILING TYPE PRIOR TO ORDERING LUMINAIRES. PROVIDE LUMINAIRES COMPATIBLE WITH CEILING TYPE.
4. RECESSED LUMINAIRE IN GRID CEILING SYSTEMS SHALL BE PROVIDED WITH SEISMIC CLIPS OR PROVIDE ATTACHMENT TO CEILING GRID SYSTEM AND SUPPORTED PER PROJECT MANUAL AND DETAIL **"1/E1.04"**.
5. LUMINAIRE TYPE IS SHOWN ONLY ONCE, AS "TYP." IN EVERY ROOM. PROVIDE SAME TYPE OF LUMINAIRE THROUGH-OUT SAME ROOM UNLESS OTHERWISE INDICATED.
6. PROVIDE NO. 10 AWG, MINIMUM, CONDUCTORS FOR EXIT SIGNS AND SECURITY LIGHT CIRCUITS.

KEYNOTES	
L1	WIRE EMERGENCY/EXIT SIGN LIGHT FIXTURES IN THIS UNIT TO A SPARE 20AMP, 1-POLE CIRCUIT BREAKER IN THE EXISTING EMERGENCY PANELBOARD "XXX".
L2	LED STRIP LIGHT FIXTURE MOUNTED INSIDE DISPLAY CASE ABOVE THE DOOR. REFER TO ARCHITECTURAL DETAIL " X-AX.XX".
L4	MOUNT LIGHT FIXTURES AT 10'-0"A.F.F. IN THIS ROOM.
L14	WIRE NEW EXTERIOR BUILDING LIGHT FIXTURES TO THE SAME CIRCUITS AND CONTROL AS THE EXISTING EXTERIOR BUILDING LIGHT FIXTURES.
L15	REFER TO THE ARCHITECTURAL EXTERIOR BUILDING ELEVATIONS FOR THE EXACT MOUNTING HEIGHT AND LOCATION OF NEW EXTERIOR WALL MOUNTED LIGHT FIXTURES.
L20	LIGHT SWITCH IS TO CONTROL ALL LIGHTING IN THIS LOBBY AREA.
L28	MOUNT THIS LIGHT FIXTURE UPSIDE DOWN, TO ILLUMINATE THE CEILING ABOVE.



UNIT N3 - LOWER LEVEL LIGHTING PLAN

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

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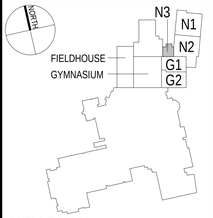

KEY PLAN

CONSTRUCTION DOCUMENTS

BRIAN W. BUTLER REGISTERED No. PE10000XX STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT N3 - LOWER LEVEL LIGHTING PLAN

E4.03

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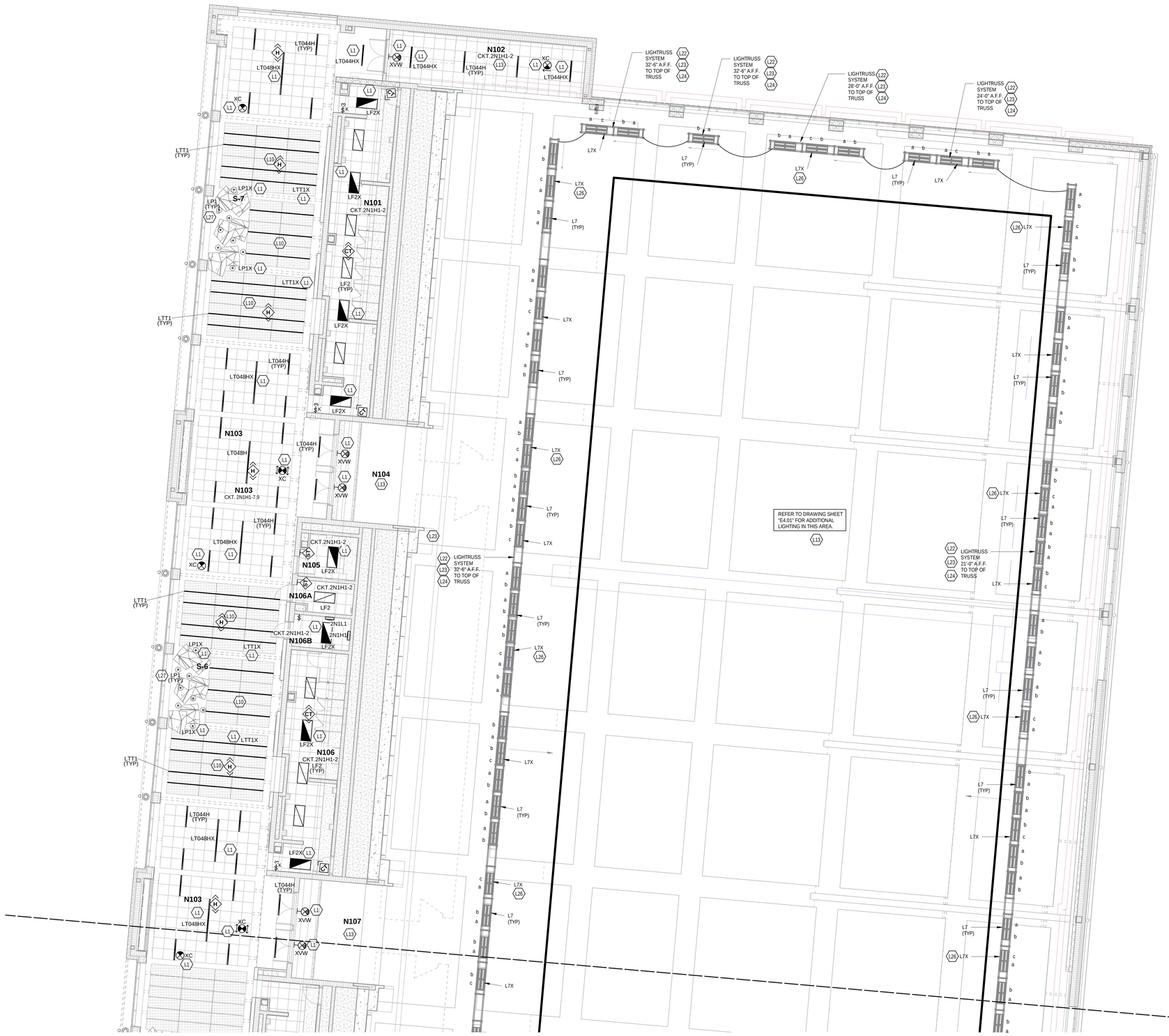

UNIT N1 - FIRST FLOOR LIGHTING PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT N1		
ROOM NO.	ROOM NAME	AREA (SF)
N101	WOMEN'S RESTROOM	603 SF
N102	POOL BALCONY	412 SF
N103	UPPER CONCOURSE	6428 SF
N104	VOMITORIUM	389 SF
N105	FAMILY RR	81 SF
N106	MEN'S RESTROOM	407 SF
N107	VOMITORIUM	390 SF

GENERAL NOTES - LIGHTING

1. FINAL CONNECTION TO RECESSED LUMINAIRES SHALL BE WITH FLEXIBLE METALLIC CONDUIT, MC CABLE OR MANUFACTURED WIRING SYSTEM.
2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATION OF LUMINAIRES. COORDINATE LOCATION OF LUMINAIRES, LOUDSPEAKERS, DIFFUSERS, GRILLES, AND OTHER CEILING INSTALLED ELEMENTS WITH THEIR RESPECTIVE INSTALLERS.
3. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND ROOM FINISH SCHEDULE TO DETERMINE PROPER TYPE OF LUMINAIRE TRIM REQUIRED FOR CEILING TYPE PRIOR TO ORDERING LUMINAIRES. PROVIDE LUMINAIRES COMPATIBLE WITH CEILING TYPE.
4. RECESSED LUMINAIRE IN GRID CEILING SYSTEMS SHALL BE PROVIDED WITH SEISMIC CLIPS OR PROVIDE ATTACHMENT TO CEILING GRID SYSTEM AND SUPPORTED PER PROJECT MANUAL AND DETAIL **"1/E1.04"**.
5. LUMINAIRE TYPE IS SHOWN ONLY ONCE, AS "TYP." IN EVERY ROOM. PROVIDE SAME TYPE OF LUMINAIRE THROUGH-OUT SAME ROOM UNLESS OTHERWISE INDICATED.
6. PROVIDE NO. 10 AWG, MINIMUM, CONDUCTORS FOR EXIT SIGNS AND SECURITY LIGHT CIRCUITS.

KEYNOTES

L1	WIRE EMERGENCY/EXIT SIGN LIGHT FIXTURES IN THIS UNIT TO A SPARE 20AMP, 1-POLE CIRCUIT BREAKER IN THE EXISTING EMERGENCY PANELBOARD "XXX".
L10	LIGHT FIXTURES MOUNTED IN THIS SECTION OF THE CEILING CLOUD SYSTEM ARE TO BE MOUNTED IN THE SPACE PROVIDED BETWEEN THE CLOUDS. FIXTURE SHALL EXTEND UP THE VERTICAL SURFACE AT BOTH ENDS OF THE CLOUDS.
L13	ALL CONDUITS IN THIS AREA ARE TO BE OF A PVC TYPE RATED FOR A POOL ENVIRONMENT.
L22	LIGHTRUSS SYSTEM TO BE MOUNTED AT HEIGHTS SHOWN. ELECTRICAL CONTRACTOR TO PROVIDE AN ESTIMATE FOR LABOR AND MATERIAL FOR APPROXIMATELY 110 SUPPORT POINTS OF AIRCRAFT CABLES AND HARDWARE. ALSO APPROXIMATELY 6 POWER DROPS. ALL WIRING INTEGRAL TO THE TRUSS SYSTEM IS BY THE MANUFACTURER AND IS INCLUDED IN THE ALLOWANCE COST.
L23	LIGHTRUSS SYSTEM LIGHT FIXTURES "L7" ARE TO BE CONTROLLED BY MOMENTARY CONTACT SWITCHES "a" AND "b" THAT ARE RUN THROUGH LIGHTING CONTACTORS "LC-a" AND "LC-b". LIGHT FIXTURES LABELED "a" TO "LC-a" AND LIGHT FIXTURES LABELED "b" TO "LC-b". REFER TO DRAWING SHEETS E4.02 AND E4.07 FOR MOMENTARY CONTACT SWITCHES AND LIGHTING CONTACTOR LOCATIONS AND ADDITIONAL REQUIREMENTS.
L24 (1)	LIGHTRUSS SYSTEM LIGHT FIXTURES "L7X" ARE TO BE CONTROLLED BY A MOMENTARY CONTACT SWITCH "c",THAT IS RUN THROUGH LIGHTING CONTACTOR "LC-c". WIRE THE "L7X" EMERGENCY LIGHT FIXTURES TO SPARE 30-AMP, 1-POLE CIRCUIT BREAKERS IN EXISTING EMERGENCY PANELBOARD "2GXH1". A TOTAL OF "3" EMERGENCY CIRCUITS ARE REQUIRED. REMOTE EMERGENCY TRANSFER DEVICES ARE TO BE LOCATED IN ROOM N115. REFER TO DRAWING SHEETS E4.02 AND E4.07 FOR MOMENTARY CONTACT SWITCH AND LIGHTING CONTACTOR LOCATIONS AND ADDITIONAL REQUIREMENTS.
L26	THIS "L7X" LIGHT FIXTURE IS TO BE A NIGHT LIGHT.
L27	THE LP1 AND LP1X LIGHT FIXTURES ABOVE THE STAIRS ARE TO BE MOUNTED AT STAGGERED MOUNTING HEIGHTS. MOUNTING HEIGHTS ARE TO BE DETERMINED IN THE FIELD, PER THE ARCHITECTS INSTRUCTION.

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ARCHITECT

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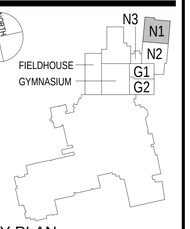

KEY PLAN

CONSTRUCTION DOCUMENTS



DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT N1 - FIRST FLOOR LIGHTING PLAN

E4.06

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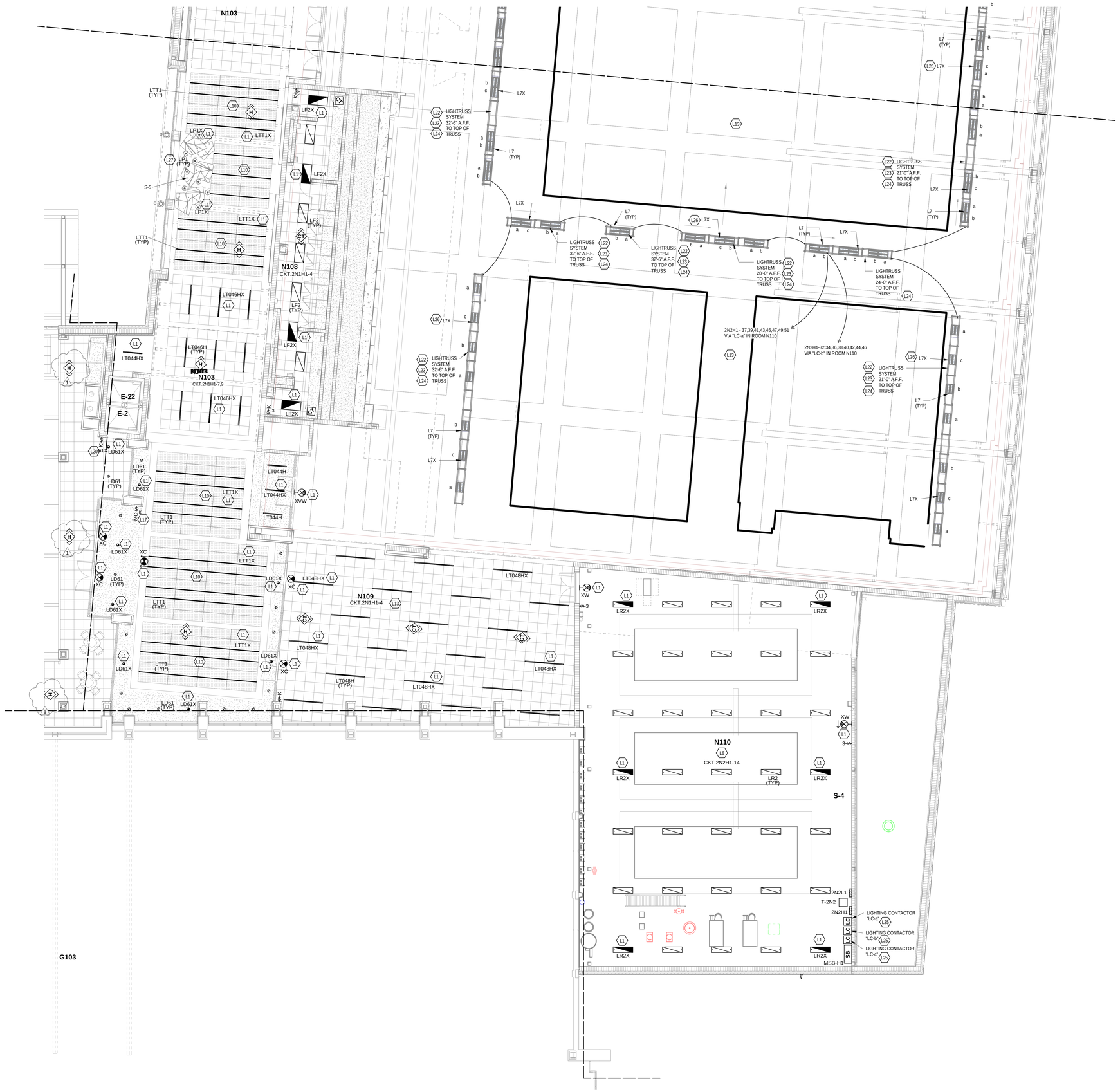

UNIT N2 - FIRST FLOOR LIGHTING PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT N2		
ROOM NO.	ROOM NAME	AREA (SF)
N103	UPPER CONCOURSE	6428 SF
N107	VOMITORIUM	390 SF
N108	WOMEN'S RESTROOM	658 SF
N110	MECHANICAL ROOM	4206 SF
S-4	STAIR	166 SF

GENERAL NOTES - LIGHTING

1. FINAL CONNECTION TO RECESSED LUMINAIRES SHALL BE WITH FLEXIBLE METALLIC CONDUIT, MC CABLE OR MANUFACTURED WIRING SYSTEM.
2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATION OF LUMINAIRES, COORDINATE LOCATION OF LUMINAIRES, LOUDSPEAKERS, DIFFUSERS, GRILLES, AND OTHER CEILING INSTALLED ELEMENTS WITH THEIR RESPECTIVE INSTALLERS.
3. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND ROOM FINISH SCHEDULE TO DETERMINE PROPER TYPE OF LUMINAIRE TRIM REQUIRED FOR CEILING TYPE PRIOR TO ORDERING LUMINAIRES. PROVIDE LUMINAIRES COMPATIBLE WITH CEILING TYPE.
4. RECESSED LUMINAIRE IN GRID CEILING SYSTEMS SHALL BE PROVIDED WITH SEISMIC CLIPS OR PROVIDE ATTACHMENT TO CEILING GRID SYSTEM AND SUPPORTED PER PROJECT MANUAL AND DETAIL **"1/E1.04"**.
5. LUMINAIRE TYPE IS SHOWN ONLY ONCE, AS "TYP." IN EVERY ROOM. PROVIDE SAME TYPE OF LUMINAIRE THROUGH-OUT SAME ROOM UNLESS OTHERWISE INDICATED.
6. PROVIDE NO. 10 AWG, MINIMUM, CONDUCTORS FOR EXIT SIGNS AND SECURITY LIGHT CIRCUITS.

KEYNOTES

L1	WIRE EMERGENCY/EXIT SIGN LIGHT FIXTURES IN THIS UNIT TO A SPARE 20AMP, 1-POLE CIRCUIT BREAKER IN THE EXISTING EMERGENCY PANELBOARD "XXX".
L6	MOUNT LIGHT FIXTURES AT 10'-0"A.F.F. AND TO MISS MECHANICAL EQUIPMENT IN THIS ROOM.
L10	LIGHT FIXTURES MOUNTED IN THIS SECTION OF THE CEILING CLOUD SYSTEM ARE TO BE MOUNTED IN THE SPACE PROVIDED BETWEEN THE CLOUDS. FIXTURE SHALL EXTEND UP THE VERTICAL SURFACE AT BOTH ENDS OF THE CLOUDS.
L13	ALL CONDUITS IN THIS AREA ARE TO BE OF A PVC TYPE RATED FOR A POOL ENVIRONMENT.
L17	LIGHT SWITCH IS TO CONTROL ALL LIGHTING IN THE CONCOURSE AREAS.
L20	LIGHT SWITCH IS TO CONTROL ALL LIGHTING IN THIS LOBBY AREA.
L22	LIGHTRUSS SYSTEM TO BE MOUNTED AT HEIGHTS SHOWN. ELECTRICAL CONTRACTOR TO PROVIDE AN ESTIMATE FOR LABOR AND MATERIAL FOR APPROXIMATELY 110 SUPPORT POINTS OF AIRCRAFT CABLES AND HARDWARE. ALSO APPROXIMATELY 6 POWER DROPS. ALL WIRING INTEGRAL TO THE TRUSS SYSTEM IS BY THE MANUFACTURER AND IS INCLUDED IN THE ALLOWANCE COST.
L23	LIGHTRUSS SYSTEM LIGHT FIXTURES "L7" ARE TO BE CONTROLLED BY MOMENTARY CONTACT SWITCHES "a" AND "b" THAT ARE RUN THROUGH LIGHTING CONTACTORS "LC-a" AND "LC-b". LIGHT FIXTURES LABELED "a" TO "LC-a" AND LIGHT FIXTURES LABELED "b" TO "LC-b". REFER TO DRAWING SHEETS E4.02 AND E4.07 FOR MOMENTARY CONTACT SWITCHES AND LIGHTING CONTACTOR LOCATIONS AND ADDITIONAL REQUIREMENTS.
L24 (1)	LIGHTRUSS SYSTEM LIGHT FIXTURES "L7X" ARE TO BE CONTROLLED BY A MOMENTARY CONTACT SWITCH "2-[%A]" IS RUN THROUGH LIGHTING CONTACTOR "LC-c". WIRE THE "L7X" EMERGENCY LIGHT FIXTURES TO SPARE 20-AMP, 1-POLE CIRCUIT BREAKERS IN EXISTING EMERGENCY PANELBOARD "2GXH1". A TOTAL OF "3" EMERGENCY CIRCUITS ARE REQUIRED. REMOTE EMERGENCY TRANSFER DEVICES ARE TO BE LOCATED IN ROOM N110. REFER TO DRAWING SHEETS E4.02 AND E4.07 FOR MOMENTARY CONTACT SWITCH AND LIGHTING CONTACTOR LOCATIONS AND ADDITIONAL REQUIREMENTS.
L25	LIGHTING CONTACTORS FOR THE LIGHTRUSS SYSTEM LIGHT FIXTURES IN THE POOL AREA. REFER TO DRAWING SHEETS E4.02, E4.06, AND E4.07 FOR ADDITIONAL REQUIREMENTS.
L26	THIS "L7X" LIGHT FIXTURE IS TO BE A NIGHT LIGHT.
L27	THE LP1 AND LP1X LIGHT FIXTURES ABOVE THE STAIRS ARE TO BE MOUNTED AT STAGGERED MOUNTING HEIGHTS. MOUNTING HEIGHTS ARE TO BE DETERMINED IN THE FIELD, PER THE ARCHITECTS INSTRUCTION.

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

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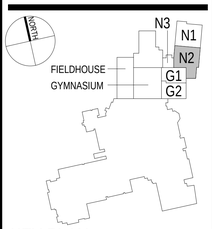

KEY PLAN

CONSTRUCTION DOCUMENTS

BRIAN W. BUTLER REGISTERED No. PE10800018 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT N2 - FIRST FLOOR LIGHTING PLAN

E4.07

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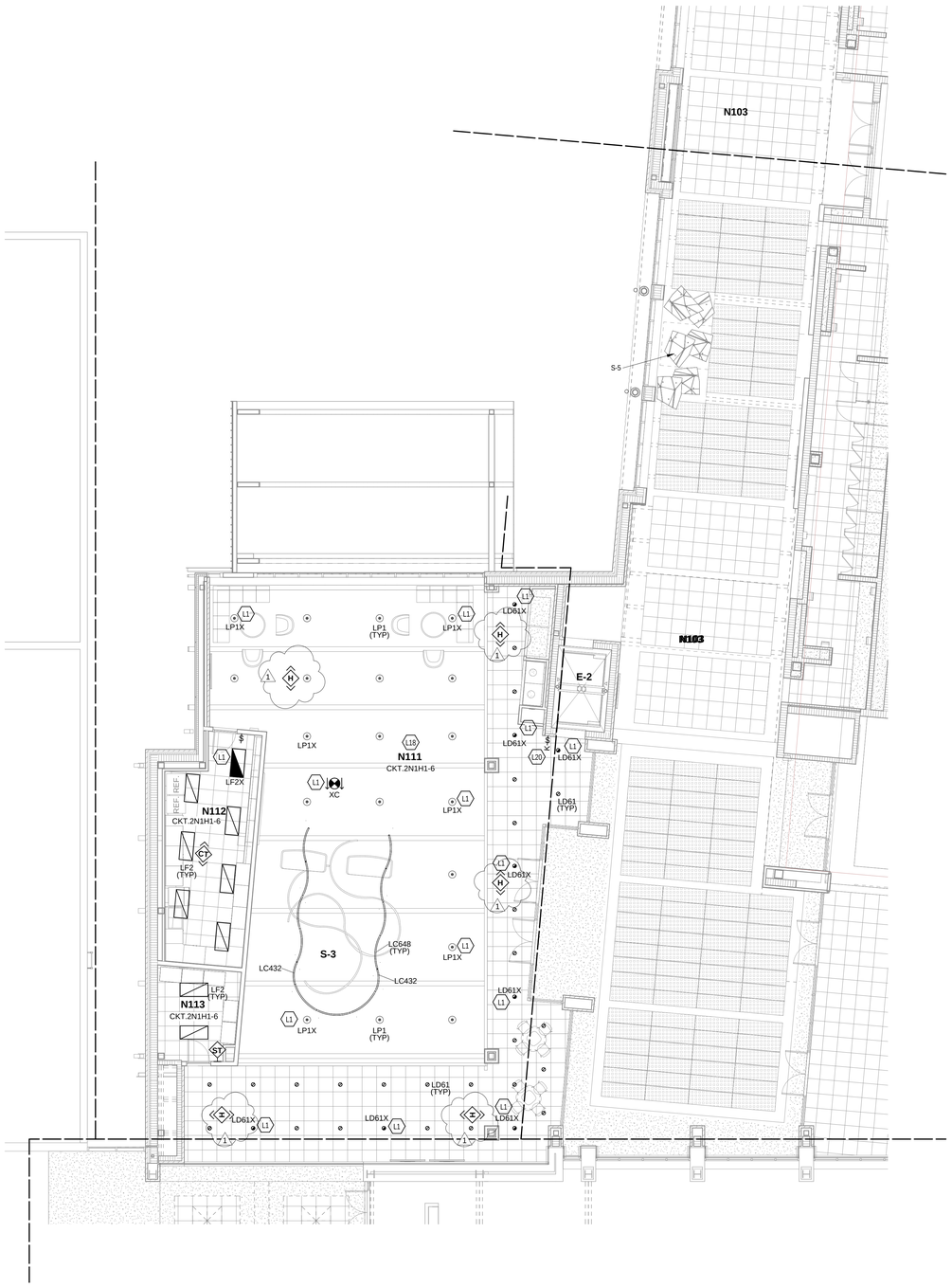
ROOM LEGEND - FIRST FLOOR UNIT N3		
ROOM NO.	ROOM NAME	AREA (SF)
E-2	ELEVATOR	84 SF
N111	UPPER LEVEL LOBBY	3596 SF
N112	CONCESSIONS	352 SF
S-3	STAIR	235 SF

GENERAL NOTES - LIGHTING

1. FINAL CONNECTION TO RECESSED LUMINAIRES SHALL BE WITH FLEXIBLE METALLIC CONDUIT, MC CABLE OR MANUFACTURED WIRING SYSTEM.
2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATION OF LUMINAIRES, COORDINATE LOCATION OF LUMINAIRES, LOUDSPEAKERS, DIFFUSERS, GRILLES, AND OTHER CEILING INSTALLED ELEMENTS WITH THEIR RESPECTIVE INSTALLERS.
3. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND ROOM FINISH SCHEDULE TO DETERMINE PROPER TYPE OF LUMINAIRE TRIM REQUIRED FOR CEILING TYPE PRIOR TO ORDERING LUMINAIRES. PROVIDE LUMINAIRES COMPATIBLE WITH CEILING TYPE.
4. RECESSED LUMINAIRE IN GRID CEILING SYSTEMS SHALL BE PROVIDED WITH SEISMIC CLIPS OR PROVIDE ATTACHMENT TO CEILING GRID SYSTEM AND SUPPORTED PER PROJECT MANUAL AND DETAIL **"1/E1.04"**.
5. LUMINAIRE TYPE IS SHOWN ONLY ONCE, AS "TYP." IN EVERY ROOM. PROVIDE SAME TYPE OF LUMINAIRE THROUGH-OUT SAME ROOM UNLESS OTHERWISE INDICATED.
6. PROVIDE NO. 10 AWG, MINIMUM, CONDUCTORS FOR EXIT SIGNS AND SECURITY LIGHT CIRCUITS.

KEYNOTES	
L1	WIRE EMERGENCY/EXIT SIGN LIGHT FIXTURES IN THIS UNIT TO A SPARE 20AMP, 1-POLE CIRCUIT BREAKER IN THE EXISTING EMERGENCY PANELBOARD "XXX".
L18	LIGHT FIXTURES IN THIS AREA ARE TO BE MOUNTED AT 10'-0"A.F.F. TO THE BOTTOM OF THE LIGHT FIXTURE.
L20	LIGHT SWITCH IS TO CONTROL ALL LIGHTING IN THIS LOBBY AREA.



UNIT N3 - FIRST FLOOR LIGHTING PLAN

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

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
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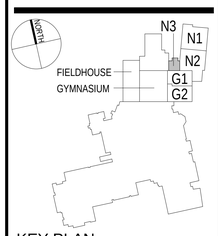
350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204



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UNIT N3 - FIRST FLOOR LIGHTING PLAN

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UNIT N1 - NATATORIUM LOWER LEVEL POWER PLAN

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

ROOM LEGEND - LOWER LEVEL UNIT N1		
ROOM NO.	ROOM NAME	AREA (SF)
N003	COACH	260 SF
N004	RESTROOM	87 SF
N005	CUSTODIAL	53 SF
N006	LOCKER ROOM	788 SF
N008	LOCKER ROOM	718 SF
N009	TECHNOLOGY	43 SF
N010	VESTIBULE	64 SF
N011	VESTIBULE	59 SF
N013	POOL CORRIDOR	263 SF
N014	VESTIBULE	59 SF
N015	VESTIBULE	63 SF
N016	ELECTRICAL	43 SF
N017	LOCKER ROOM	717 SF
N019	LOCKER ROOM	784 SF
N021	POOL DECK	13162 SF
N022	POOL	14163 SF
N023	CUSTODIAL	53 SF
N024	RESTROOM	80 SF
N025	COACH	234 SF
N026	LOWER CONCOURSE	8296 SF
N027	POOL CORRIDOR	263 SF

GENERAL NOTES - POWER

1. PROVIDE REVISED TYPED PANELBOARD DIRECTORIES FOR EACH PANELBOARD ADDED OR MODIFIED DURING CONSTRUCTION. FIELD VERIFY EXISTING CIRCUIT INFORMATION WITH OWNER'S ASSISTANCE TO ENSURE FINAL DIRECTORY IS ACCURATE. UNUSED SPARE BREAKERS SHALL BE IN THE OFF POSITION.
2. VIDEO PROJECTOR RECEPTACLE TO BE MOUNTED ABOVE WALL MOUNTED PROJECTOR BRACKET, 96" A.F.F. UNO.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS. SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.
4. LABEL EACH RECEPTACLE WITH THE PANEL NAME AND CIRCUIT NUMBER ON THE FACE OF EACH COVER PLATE WITH A TYPED LAMINATED LABEL.
5. PROVIDE "GFCI PROTECTED" LABEL ON COVER PLATE FOR ANY GFCI PROTECTED DEVICE.
6. CONTRACTOR SHALL INCREASE CIRCUIT CONDUCTOR SIZE TO COMPENSATE FOR VOLTAGE DROP DUE TO EXCESSIVE CIRCUIT LENGTHS. IN NO CASE SHALL VOLTAGE DROP EXCEED NFPA 70 (N.E.C.) REQUIREMENTS.
7. REFER TO MECHANICAL PLANS FOR LOCATION OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES PER NEC.
8. REFER TO "CONTROL SCHEMATICS" MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
9. ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE, SHALL BE BONDED WITH A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR. MAINTAIN MECHANICAL/ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEM.

KEYNOTES

P1	TECHNOLOGY RACK (IDF) RECEPTACLE. COORDINATE MOUNTING LOCATION AND INSTALLATION REQUIREMENTS WITH THE TECHNOLOGY CONTRACTOR PRIOR TO ROUGH-IN. PROVIDE #10 CONDUCTORS.
P2	TECHNOLOGY RACK (IDF) BACKBOARD RECEPTACLES. REFER TO DETAIL "4/E1.02" FOR MOUNTING LOCATIONS AND REQUIREMENTS. PROVIDE #10 CONDUCTORS.
P11	MOUNT DUPLEX RECEPTACLE IN THE FACE OF THE BUILT-IN BENCH AT THIS LOCATION.
P12	RECEPTACLE FOR T.V. MONITOR IS MOUNTED INSIDE OF THE VIDEO OUTLET BOX PROVIDED BY THE TECHNOLOGY CONTRACTOR. REFER TO THE TECHNOLOGY PLANS FOR ADDITIONAL REQUIREMENTS AND MOUNTING HEIGHT AND LOCATION.
P13	CONTROL SWITCH FOR THE OVERHEAD COILING GRILLE IS PROVIDED BY THE GRILLE MANUFACTURER.
P15	PROVIDE A TWISTLOCK SPECIAL PURPOSE 30AMP RECEPTACLE FOR THE TECHNOLOGY RACK AT THIS LOCATION AND WIRE TO A SPARE CIRCUIT IN THE NEAREST 120/208V EMERGENCY PANELBOARD. PROVIDE A NEW 30AMP 1-POLE CIRCUIT BREAKER AND WIRE WITH #10 CONDUCTORS.
P19	REFER TO THE POOL TIMING PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS, MOUNTING HEIGHTS, AND ADDITIONAL REQUIREMENTS FOR THE SCOREBOARD AND RECORDS BOARD PRIOR TO ROUGH-IN.
P22	PROVIDE POWER TO THE WALL MOUNTED HAIR DRYER AT THIS LOCATION. REFER TO THE RESTROOM FIXTURES AND ACCESSORIES SCHEDULE ON DRAWING SHEET A1.13 FOR MOUNTING HEIGHT AND LOCATION PRIOR TO ROUGH-IN.
P23	MOUNT DUPLEX RECEPTACLES HORIZONTALLY ABOVE COUNTERTOP BACKSPLASH AND BELOW THE MIRROR AT THIS LOCATION. REFER TO THE A7 DRAWING SHEETS FOR EXACT MOUNTING HEIGHT AND LOCATION PRIOR TO ROUGH-IN.
P25	ALL CONDUITS IN THIS AREA ARE TO BE OF A PVC TYPE RATED FOR A POOL ENVIRONMENT.
P28	VERIFY EXACT MOUNTING HEIGHT AND LOCATION WITH THE POOL TIMING PLANS AND SPECIFICATIONS.
P30	UNDER WATER POOL LIGHT FIXTURE IS BY THE POOL CONTRACTOR. ALL CONDUITS, WIRING AND WALL MOUNTED JUNCTION BOXES ARE BY THE ELECTRICAL CONTRACTOR. REFER TO THE COMPETITION POOL TIMING SYSTEM LAYOUT AND DETAILS SHEET PL7.0 FOR ACTUAL LOCATION OF LIGHT FIXTURE AND ADDITIONAL REQUIREMENTS.

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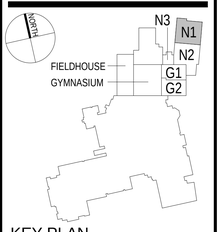

KEY PLAN

CONSTRUCTION DOCUMENTS

BRIAN W. BUTLER REGISTERED No. PE10000615 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT N1 - LOWER LEVEL POWER PLAN

E5.01

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ROOM LEGEND - LOWER LEVEL UNIT N2

ROOM NO.	ROOM NAME	AREA (SF)
N021	POOL DECK	13162 SF
N021A	TIMING	140 SF
N021C	VESTIBULE	74 SF
N021D	VIDEO DISTRIBUTION	114 SF
N022	POOL	14163 SF
N026	LOWER CONCOURSE	8296 SF
N027	POOL CORRIDOR	263 SF
N028	HOSPITALITY	1668 SF
N028A	FOOD PREP	397 SF
N029	THERAPY POOL	1470 SF
N030	DIVING	1449 SF
N031	RESTROOM	219 SF
N032	RESTROOM	229 SF
N033	TECHNOLOGY	92 SF
N033A	A/V STORAGE	80 SF
N034	CONCESSIONS	150 SF
N034A	ELECTRICAL	49 SF
N035	POOL STORAGE	538 SF
N036	POOL EQUIPMENT	2789 SF
N036A	POOL EQUIPMENT	118 SF
N036B	POOL EQUIPMENT	114 SF
N037	POOL STORAGE	1139 SF
N037A	VESTIBULE	89 SF
N038	FIRE RISER	124 SF
N039	PASSAGE	690 SF
S-4	STAIR	166 SF

GENERAL NOTES - POWER

1. PROVIDE REVISED TYPED PANELBOARD DIRECTORIES FOR EACH PANELBOARD ADDED OR MODIFIED DURING CONSTRUCTION. FIELD VERIFY EXISTING CIRCUIT INFORMATION WITH OWNER'S ASSISTANCE TO ENSURE FINAL DIRECTORY IS ACCURATE. UNUSED SPARE BREAKERS SHALL BE IN THE OFF POSITION.
2. VIDEO PROJECTOR RECEPTACLE TO BE MOUNTED ABOVE WALL MOUNTED PROJECTOR BRACKET, 96" A.F.F. UNO.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS. SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.
4. LABEL EACH RECEPTACLE WITH THE PANEL NAME AND CIRCUIT NUMBER ON THE FACE OF EACH COVER PLATE WITH A TYPED LAMINATED LABEL.
5. PROVIDE "GFCI PROTECTED" LABEL ON COVER PLATE FOR ANY GFCI PROTECTED DEVICE.
6. CONTRACTOR SHALL INCREASE CIRCUIT CONDUCTOR SIZE TO COMPENSATE FOR VOLTAGE DROP DUE TO EXCESSIVE CIRCUIT LENGTHS. IN NO CASE SHALL VOLTAGE DROP EXCEED NFPA 70 (N.E.C.) REQUIREMENTS.
7. REFER TO MECHANICAL PLANS FOR LOCATION OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES PER NEC.
8. REFER TO "CONTROL SCHEMATICS" MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
9. ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE, SHALL BE BONDED WITH A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR. MAINTAIN MECHANICAL/ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEM.

KEYNOTES

P1	TECHNOLOGY RACK (IDF) RECEPTACLE. COORDINATE MOUNTING LOCATION AND INSTALLATION REQUIREMENTS WITH THE TECHNOLOGY CONTRACTOR PRIOR TO ROUGH-IN. PROVIDE #10 CONDUCTORS.
P2	TECHNOLOGY RACK (IDF) BACKBOARD RECEPTACLES. REFER TO DETAIL "4/EL02" FOR MOUNTING LOCATIONS AND REQUIREMENTS. PROVIDE #10 CONDUCTORS.
P3	COORDINATE LOCATION OF LIGHT SWITCH AND LIGHT FIXTURES IN THE ELEVATOR PIT WITH THE ELEVATOR INSTALLER PRIOR TO ROUGH-IN. TAP THE SOURCE SIDE OF THE PIT RECEPTACLE FOR HTE 120V LIGHT FIXTURES. LIGHT FIXTURE IS TO BE 54 WATT LED, 120V, 4-FOOT LONG, WALL MOUNTED, VANDAL RESISTANT WRAP AROUND FOR HIGH ABUSE AREAS. PROVIDE WITH EMERGENCY BATTERY BACKUP. MANUFACTURERS FAIL-SAFE FPS-4 SERIES, KENALL N1048 SERIES, LUMINAIRE LED LVP751 SERIES, ECLIPSE 714 LED SERIES.
P5	PROVIDE ELEVATOR DISCONNECT PER THE MANUFACURERS RECOMMENDATIONS WITH SHUNT-TRIP DEVICE IN ACCORDANCE WITH ALL NATIONAL, STATE, AND LOCAL CODE REQUIREMENTS.
P6	PROVIDE ELEVATOR CAB LIGHTS DISCONNECT PER THE MANUFACTURERS RECOMMENDATIONS AND IN ACCORDANCE WITH ALL NATIONAL, STATE, AND LOCAL CODE REQUIREMENTS.
P7	NEW DEVICES MOUNTED ON EXISTING WALLS ARE TO BE MOUNTED IN SURFACE BOXES WITH SURFACE RACEWAY.
P9	MOUNT THE RECEPTACLES IN THE KNEE SPACE BELOW THE COUNTERTOP ON THE BACK WALL.
P10	REFER TO THE POOL PLANS AND SPECIFICATIONS FOR ALL LOCATIONS AND WIRING REQUIREMENTS FOR THE POOL EQUIPMENT IN THIS ROOM, THE POOL DECK, AND THE MECHANICAL MEZZANINE ABOVE. ALL OF THE POOL EQUIPMENT IS TO BE WIRED THROUGH THE POOL ELECTRICAL CONTROLLER FOR EAC OF THE TWO POOLS. CONDUITS ARE TO BE PVC WITH SEALTIGHT FITTINGS. REFER TO THE COPPER FEEDER SCHEDULE ON DRAWING SHEET E7.01 FOR WIRING AND CONDUIT SIZING REQUIREMENTS.
P11	MOUNT DUPLEX RECEPTACLE IN THE FACE OF THE BUILT-IN BENCH AT THIS LOCATION.
P12	RECEPTACLE FOR T.V. MONITOR IS MOUNTED INSIDE OF THE VIDEO OUTLET BOX PROVIDED BY THE TECHNOLOGY CONTRACTOR. REFER TO THE TECHNOLOGY PLANS FOR ADDITIONAL REQUIREMENTS AND MOUNTING HEIGHT AND LOCATION.
P13	CONTROL SWITCH FOR THE OVERHEAD COILING GRILLE IS PROVIDED BY THE GRILLE MANUFACTURER.
P15	PROVIDE A TWISTLOCK SPECIAL PURPOSE 30AMP RECEPTACLE FOR THE TECHNOLOGY RACK AT THIS LOCATION AND WIRE TO A SPARE CIRCUIT IN THE NEAREST 120/208V EMERGENCY PANELBOARD. PROVIDE A NEW 30AMP 1-POLE CIRCUIT BREAKER AND WIRE WITH #10 CONDUCTORS.
P16	AV EQUIPMENT RACK RECEPTACLES. COORDINATE MOUNTING LOCATIONS AND ADDITIONAL INSTALLATION REQUIREMENTS WITH THE AV CONTRACTOR PRIOR TO ROUGH-IN.
P17	RECEPTACLE FOR CABINET MOUNTED MICROWAVE. REFER TO THE A7 DRAWING SHEETS FOR EXACT MOUNTING HEIGHT AND LOCATION PRIOR TO ROUGH-IN.
P18	SPECIAL PURPOSE RECEPTACLE FOR OVEN MOUNTED IN CABINET. REFER TO A7 DRAWING SHEETS FOR EXACT MOUNTING HEIGHT AND LOCATION PRIOR TO ROUGH-IN.
P19	REFER TO THE POOL TIMING PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS, MOUNTING HEIGHTS, AND ADDITIONAL REQUIREMENTS FOR THE SCOREBOARD AND RECORDS BOARD PRIOR TO ROUGH-IN.
P25	ALL CONDUITS IN THIS AREA ARE TO BE OF A PVC TYPE RATED FOR A POOL ENVIRONMENT.
P28	VERIFY EXACT MOUNTING HEIGHT AND LOCATION WITH THE POOL TIMING PLANS AND SPECIFICATIONS.
P30	UNDER WATER POOL LIGHT FIXTURE IS BY THE POOL CONTRACTOR. ALL CONDUITS, WIRING AND WALL MOUNTED JUNCTION BOXES ARE BY THE ELECTRICAL CONTRACTOR. REFER TO THE COMPETITION POOL TIMING SYSTEM LAYOUT AND DETAILS SHEET PL7.0 FOR ACTUAL LOCATION OF LIGHT FIXTURE AND ADDITIONAL REQUIREMENTS.
P31	REFER TO THE "PL" SERIES DRAWINGS AND DETAILS FOR LOCATION OF CONTROL PANELS AND ADDITIONAL WIRING REQUIREMENTS.

UNIT N2 - NATATORIUM LOWER LEVEL POWER PLAN

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

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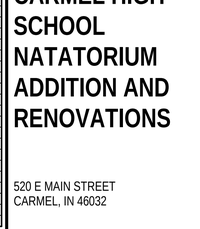

KEY PLAN

CONSTRUCTION DOCUMENTS



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PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT N2 - LOWER LEVEL POWER PLAN

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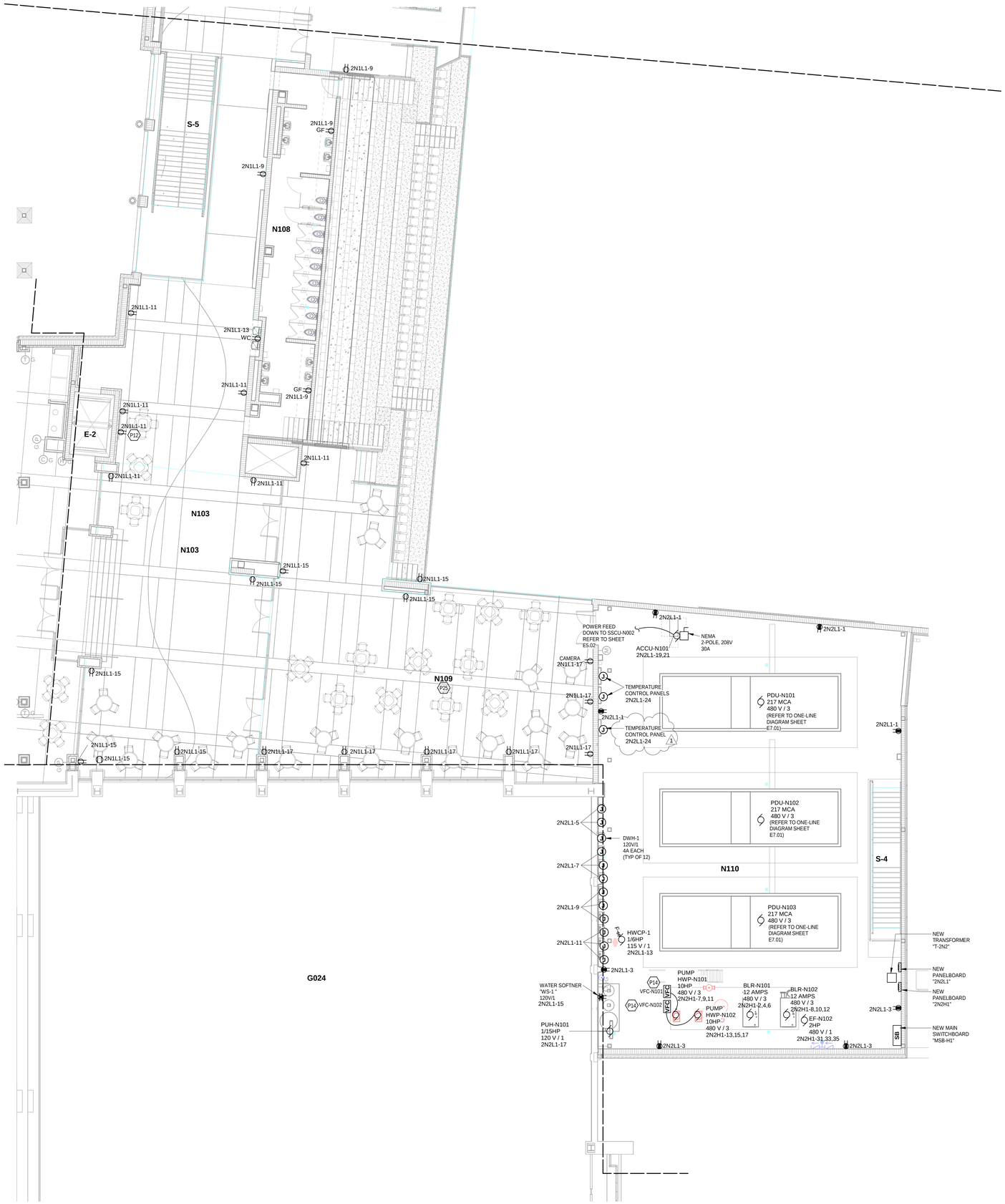

UNIT N2 - FIRST FLOOR POWER PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT N2		
ROOM NO.	ROOM NAME	AREA (SF)
N103	UPPER CONCOURSE	6428 SF
N107	VOMITORIUM	390 SF
N108	WOMEN'S RESTROOM	658 SF
N110	MECHANICAL ROOM	4206 SF
S-4	STAIR	166 SF

GENERAL NOTES - POWER

1. PROVIDE REVISED TYPED PANELBOARD DIRECTORIES FOR EACH PANELBOARD ADDED OR MODIFIED DURING CONSTRUCTION. FIELD VERIFY EXISTING CIRCUIT INFORMATION WITH OWNER'S ASSISTANCE TO ENSURE FINAL DIRECTORY IS ACCURATE. UNUSED SPARE BREAKERS SHALL BE IN THE OFF POSITION.
2. VIDEO PROJECTOR RECEPTACLE TO BE MOUNTED ABOVE WALL MOUNTED PROJECTOR BRACKET, 96" A.F.F. UNO.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS. SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.
4. LABEL EACH RECEPTACLE WITH THE PANEL NAME AND CIRCUIT NUMBER ON THE FACE OF EACH COVER PLATE WITH A TYPED LAMINATED LABEL.
5. PROVIDE "GFCI PROTECTED" LABEL ON COVER PLATE FOR ANY GFCI PROTECTED DEVICE.
6. CONTRACTOR SHALL INCREASE CIRCUIT CONDUCTOR SIZE TO COMPENSATE FOR VOLTAGE DROP DUE TO EXCESSIVE CIRCUIT LENGTHS. IN NO CASE SHALL VOLTAGE DROP EXCEED NFPA 70 (N.E.C.) REQUIREMENTS.
7. REFER TO MECHANICAL PLANS FOR LOCATION OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES PER NEC.
8. REFER TO "CONTROL SCHEMATICS" MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
9. ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE, SHALL BE BONDED WITH A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR. MAINTAIN MECHANICAL/ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEM.

KEYNOTES	
P12	RECEPTACLE FOR T.V. MONITOR IS MOUNTED INSIDE OF THE VIDEO OUTLET BOX PROVIDED BY THE TECHNOLOGY CONTRACTOR. REFER TO THE TECHNOLOGY PLANS FOR ADDITIONAL REQUIREMENTS AND MOUNTING HEIGHT AND LOCATION.
P14	VFC BRANCH/FEEDER CIRCUIT PROTECTION AND CONDUCTORS ARE SIZED FOR BID PURPOSES ONLY. ACTUAL REQUIREMENTS WILL BE BASED ON THE MANUFACTURERS REQUIREMENTS AND IN COMPLIANCE WITH THE NATIONAL ELECTRIC CODE NFPA 70. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY REQUIREMENTS WITH THE SUBMITTED MANUFACTURERS OF THE EQUIPMENT AND PROVIDE THE NECESSARY CIRCUIT PROTECTION AND CONDUCTOR SIZE. VFC IS PROVIDED BY THE DIVISION 23 CONTRACTOR.
P25	ALL CONDUITS IN THIS AREA ARE TO BE OF A PVC TYPE RATED FOR A POOL ENVIRONMENT.

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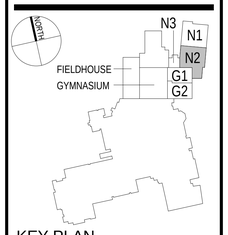

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UNIT N2 - FIRST FLOOR POWER PLAN

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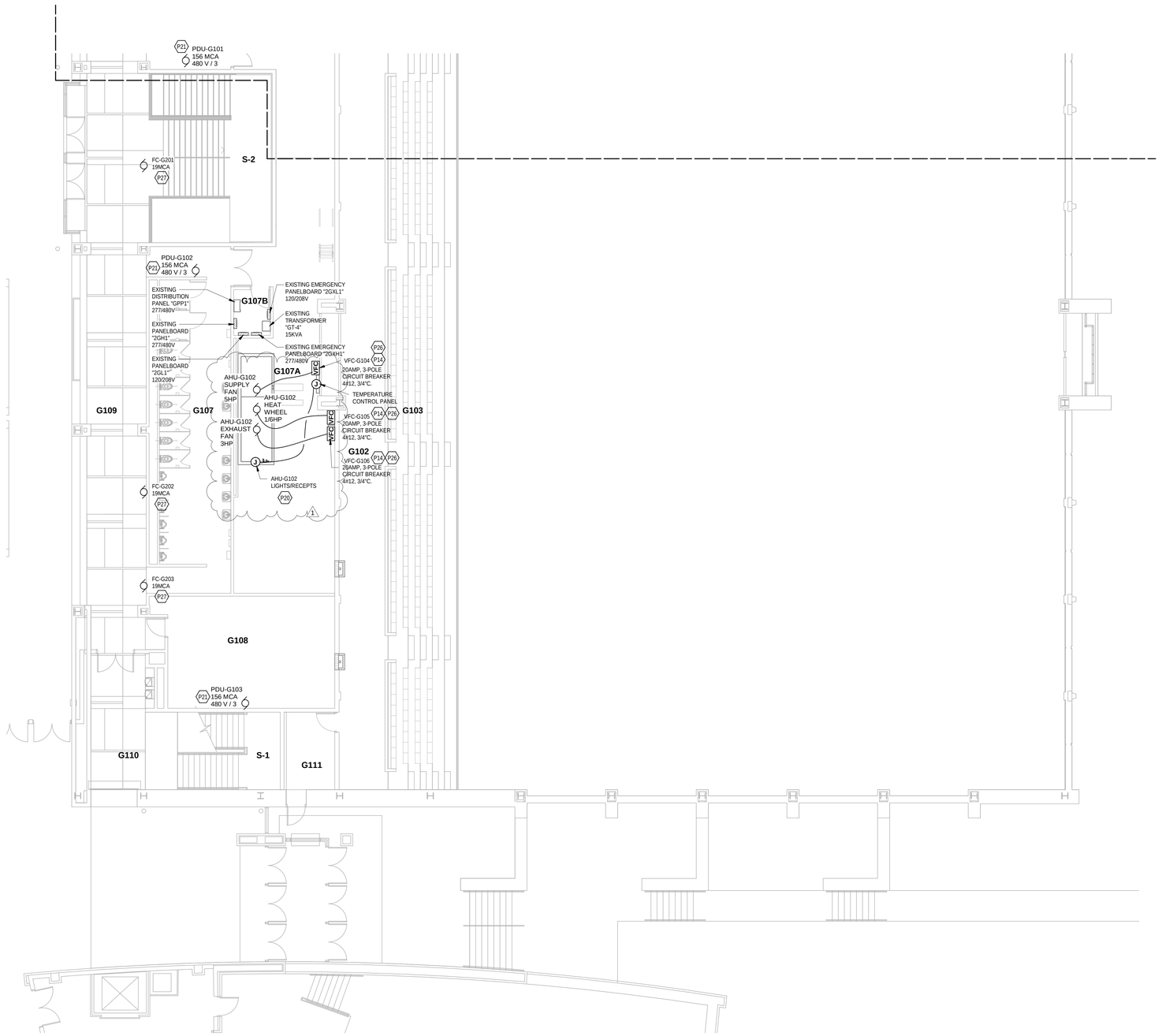

UNIT G2 - FIRST FLOOR POWER PLAN

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

ROOM LEGEND - FIRST FLOOR UNIT G2		
ROOM NO.	ROOM NAME	AREA (SF)
G102	SEATING CROSS AISLE	1669 SF
G103	POOL SEATING	2418 SF
G107	MEN'S RESTROOM	691 SF
G107A	MECHANICAL	980 SF
G107B	ELECTRICAL	46 SF
G108	TEAM ROOM	522 SF
G109	CORRIDOR	1668 SF
G110	PASSAGE	281 SF
G111	VESTIBULE	108 SF
S-1	STAIR	231 SF
S-2	STAIR	529 SF

GENERAL NOTES - POWER

1. PROVIDE REVISED TYPED PANELBOARD DIRECTORIES FOR EACH PANELBOARD ADDED OR MODIFIED DURING CONSTRUCTION. FIELD VERIFY EXISTING CIRCUIT INFORMATION WITH OWNER'S ASSISTANCE TO ENSURE FINAL DIRECTORY IS ACCURATE. UNUSED SPARE BREAKERS SHALL BE IN THE OFF POSITION.
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4. LABEL EACH RECEPTACLE WITH THE PANEL NAME AND CIRCUIT NUMBER ON THE FACE OF EACH COVER PLATE WITH A TYPED LAMINATED LABEL.
5. PROVIDE "GFCI PROTECTED" LABEL ON COVER PLATE FOR ANY GFCI PROTECTED DEVICE.
6. CONTRACTOR SHALL INCREASE CIRCUIT CONDUCTOR SIZE TO COMPENSATE FOR VOLTAGE DROP DUE TO EXCESSIVE CIRCUIT LENGTHS. IN NO CASE SHALL VOLTAGE DROP EXCEED NFPA 70 (N.E.C.) REQUIREMENTS.
7. REFER TO MECHANICAL PLANS FOR LOCATION OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES PER NEC.
8. REFER TO "CONTROL SCHEMATICS" MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
9. ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE, SHALL BE BONDED WITH A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR. MAINTAIN MECHANICAL/ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEM.

KEYNOTES	
P14	VFC BRANCH/FEEDER CIRCUIT PROTECTION AND CONDUCTORS ARE SIZED FOR BID PURPOSES ONLY. ACTUAL REQUIREMENTS WILL BE BASED ON THE MANUFACTURERS REQUIREMENTS AND IN COMPLIANCE WITH THE NATIONAL ELECTRIC CODE NFPA 70. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY REQUIREMENTS WITH THE SUBMITTED MANUFACTURERS OF THE EQUIPMENT AND PROVIDE THE NECESSARY CIRCUIT PROTECTION AND CONDUCTOR SIZE. VFC IS PROVIDED BY THE DIVISION 23 CONTRACTOR.
P20	WIRE TO A SPARE 20 AMP, 1-POLE CIRCUIT BREAKER IN THE NEAREST EXISTING 120/208V PANELBOARD WITH SPARE CAPACITY.
P21	WIRE TO EXISTING DISTRIBUTION PANEL "GPP1" IN ROOM G107B. WIRE TO A NEW 175 AMP, 3-POLE CIRCUIT BREAKER WITH 3-2/0, 1#6, 1.5"C.
P26	WIRE NEW AIR HANDLER UNIT MOTOR TO THE EXISTING PANELBOARD THAT FED AIR HANDLER THAT WAS REMOVED. PROVIDE CIRCUIT BREAKER AND WIRE SIZE AS SHOWN.
P27	WIRE THE NEW FC TO A 20AMP, 3-POLE CIRCUIT BREAKER IN THE NEAREST 277/480V PANELBOARD WITH SPARE CAPACITY.

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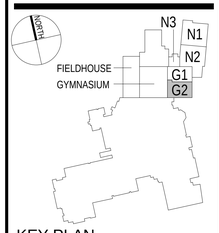

KEY PLAN

CONSTRUCTION DOCUMENTS

BRIAN W. BUTLER REGISTERED No. PE10800015 STATE OF PROFESSIONAL ENGINEER

DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

UNIT G2 - FIRST FLOOR POWER PLAN

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LUMINAIRE SCHEDULE

PLAN TYPE	MANUFACTURER/CATALOG	MOUNTING	LAMPS NO.	LAMPS WATTS	LAMPS TYPE	LAMPS LUMENS	APPLIED VOLTAGE	DESCRIPTION	VA LOAD
L7	SPI LIGHTRUSS LED GEN2 SERIES PROVIDE AN ALLOWANCE FOR MATERIAL ONLY. ADD LABOR REQUIRED FOR INSTALLATION	SUSPENDED	1	433 W	LED	54904 lm	277 V	LED INDIRECT TRUSS SYSTEM FIXTURE. NATATORIUM RATED 4,000K. COLOR SELECTED FROM MANUFACTURERS STANDARD COLORS.	433 VA
L7X	SPI LIGHTRUSS LED GEN2 SERIES PROVIDE AN ALLOWANCE FOR MATERIAL ONLY. ADD LABOR REQUIRED FOR INSTALLATION	SUSPENDED	1	433 W	LED	54904 lm	277 V	LED INDIRECT CONTINUOUS TRUSS SYSTEM FIXTURE. NATATORIUM RATED, 4,000K. COLOR TO BE SELECTED FROM MANUFACTURERS STANDARD COLORS. EMERGENCY LIGHTING CONTROL DEVICE TO SWITCH BETWEEN EMERGENCY AND NORMAL CIRCUITS.	433 VA
LBP1	COOPER INVUE	BOLLARD	1	37 W	LED	1276 lm	277 V	36" TALL BOLLARD, DIE CAST ALUMINUM HOUSING, SYMETRIC DISTRIBUTION,	37 VA
LC432	SPI LIGHTING - LINES AND ARCS SERIES	SUSPENDED	1	32 W	LED	3308 lm	277 V	AIP12235 4FT-L32W 4 FOOT RADIUS X 45 DEGREE (HIGH OUTPUT)	32 VA
LC648	SPI LIGHTING - LINES AND ARCS SERIES	SUSPENDED	1	48 W	LED	4900 lm	277 V	AIP12235 6FT-L48W 6 FOOT RADIUS X 45 DEGREE (HIGH OUTPUT)	48 VA
LD61	PORTFOLIO LD6A SERIES GOTHAM EVO SERIES PRESCOLITE LF6LED SERIES LIGHTOLIER C6L SERIES	RECESSED	1	22 W	LED	3000 lm	277 V	6-INCH ROUND APERTURE OPEN REFLECTOR LED DOWNLIGHT, MEDIUM DISTRIBUTION, CLEAR SPECULAR FINISH, SELF-FLANGED, 4000K, 80+ CRI, 0-10VDC DIMMING, BAR HANGER ACCESSORY.	22 VA
LD61X	PORTFOLIO LD6A SERIES GOTHAM EVO SERIES PRESCOLITE LF6LED SERIES LIGHTOLIER C6L SERIES	RECESSED	1	11 W	LED	1500 lm	277 V	6-INCH ROUND APERTURE OPEN REFLECTOR LED DOWNLIGHT, MEDIUM DISTRIBUTION, CLEAR SPECULAR FINISH, SELF-FLANGED, 4000K, 80+ CRI, 0-10VDC DIMMING, BAR HANGER ACCESSORY, WITH EMERGENCY TRANSFER DEVICE.	11 VA
LD62	GOTHAM EVO SERIES PRESCOLITE LF6 LED SERIES OMEGA REVELATION SERIES PORTFOLIO LD SERIES	RECESSED	1	19 W	SOLID STATE LED	2000 lm	277 V	6-INCH ROUND APERTURE LED DOWNLIGHT, OPEN REFLECTOR WIDE BEAM SPREAD, SELF-FLANGE, CLEAR SPECULAR FINISH WITH EMERGENCY TRANSFER DEVICE.	19 VA
LD62X	GOTHAM EVO SERIES PRESCOLITE LF6 LED SERIES OMEGA REVELATION SERIES PORTFOLIO LD SERIES PHILIPS P6R SERIES	RECESSED	1	19 W	SOLID STATE LED	2000 lm	277 V	6-INCH ROUND APERTURE LED DOWNLIGHT, OPEN REFLECTOR WIDE BEAM SPREAD, SELF-FLANGE, CLEAR SPECULAR FINISH.	19 VA
LDW61	FAIL-SAFE FLD6A SERIES GOTHAM EVO SHOWER SERIES PRESCOLITE LF6LEDG4 SERIES LIGHTOLIER C6L SERIES	RECESSED	1	8 W	LED	1000 lm	277 V	6-INCH ROUND APERTURE LED SHOWER LIGHT WITH REGRESSED LENS REFLECTOR, WHITE REFLECTOR AND TRIM, SELF-FLANGED, 4000K. 80+ CRI, 0-10V DIMMING DRIVER, IP65 WET LOCATION LISTED.	8 VA
LDW61X	FAIL-SAFE FLD6A SERIES GOTHAM EVO SHOWER SERIES PRESCOLITE LF6LEDG4 SERIES LIGHTOLIER C6L SERIES	RECESSED	1	8 W	LED	1000 lm	277 V	6-INCH ROUND APERTURE LED SHOWER LIGHT WITH REGRESSED LENS REFLECTOR, WHITE REFLECTOR AND TRIM, SELF-FLANGED, 4000K. 80+ CRI, 0-10V DIMMING DRIVER, IP65 WET LOCATION LISTED. PROVIDE WITH EMERGENCY TRANSFER DEVICE.	8 VA
LE1	LITHONIA WSQ LED SERIES EATON ISS IMPACT ELITE SERIES HUBBELL QSP SERIES	SURFACE	1	20 W	LED	2000 lm	277 V	HALF-CYLINDER LED WALL MOUNTED LUMINAIRE WITH DIE CAST ALUMINUM HOUSING, BOTTOM DIFFUSER FLUSH WITH THE DIE CASTING, TYPE 3 DISTRIBUTION, MANUFACTURER STANDARD COLORS. MOUNT ONTO JUNCTION BOX.	20 VA
LE1X	LITHONIA WSQ LED SERIES EATON ISS IMPACT ELITE SERIES HUBBELL QSP SERIES	SURFACE	1	20 W	LED	2000 lm	277 V	HALF-CYLINDER LED WALL MOUNTED LUMINAIRE WITH DIE CAST ALUMINUM HOUSING, BOTTOM DIFFUSER FLUSH WITH THE DIE CASTING, TYPE 3 DISTRIBUTION, MANUFACTURER STANDARD COLORS. MOUNT ONTO JUNCTION BOX. EMERGENCY TRANSFER DEVICE.	20 VA
LF2	LITHONIA CPX SERIES EATON METALUX 24 FP SERIES COLUMBIA CFP SERIES DAYBRITE 2FPZ SERIES	RECESSED	1	42 W	LED	4800 lm	277 V	2 BY 4-FOOT, EDGE LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING.	42 VA
LF2X	LITHONIA CPX SERIES EATON METALUX 24 FP SERIES COLUMBIA CFP SERIES DAYBRITE 2FPZ SERIES	RECESSED	1	42 W	LED	4800 lm	277 V	2 BY 4-FOOT, EDGE LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING WITH AN EMERGENCY TRANSFER DEVICE.	42 VA
LF3	LITHONIA CPX SERIES EATON METALUX 24 FP SERIES COLUMBIA CFP SERIES DAYBRITE 2FPZ SERIES	RECESSED	1	48 W	LED	5400 lm	277 V	2 BY 4-FOOT, EDGE LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING	48 VA
LF3X	LITHONIA CPX SERIES EATON METALUX 24 FP SERIES COLUMBIA CFP SERIES DAYBRITE 2FPZ SERIES	RECESSED	1	53 W	LED	6000 lm	277 V	2 BY 4-FOOT, EDGE LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING WITH EMERGENCY TRANSFER DEVICE.	53 VA
LN4	LUMENWERX VIA 4 SERIES MARK ARCHITECTURAL SLOT 4 SERIES LITECONTROL MOD 4 LED SERIES	SUSPENDED	1	101 W	LED	1200 lm	277 V	4' LONG, INDIRECT/DIRECT PENDANT HUNG FIXTURE. 4000K, 80+ CRI, 0-10V DIMMING DRIVER, ALUMINUM/SILVER FINISH, SQUARE CANOPY, AIRCRAFT CABLE SUSPENSION AND WHITE POWER CORD. MOUNT AT 8'-6" ABOVE FINISH FLOOR.	26 VA
LP1	SPI LIGHTING PAVO 4 SERIES	SUSPENDED	1	53 W	LED	4723 lm	277 V	PAVO 4" X 4-FOOT TALL, 4000K, MEDIUM DISTRIBUTION DOWNLIGHT	53 VA
LP1X	SPI LIGHTING PAVO 4 SERIES	SUSPENDED	1	53 W	LED	4723 lm	277 V	PAVO 4" X 4-FOOT TALL, 4000K, MEDIUM DISTRIBUTION DOWNLIGHT, EMERGENCY TRANSFER DEVICE	53 VA
LP046L	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES FINELITE HP-4 SERIES	SUSPENDED	1	48 W	SOLID STATE LED	800 lm	277 V	4" BY 6-FOOT LED LINEAR RECESS SLOT FIXTURE; SUSPEND FIXTURE SO BOTTOM OF FIXTURE IS SAME HEIGHT AS ADJACENT CLOUD, 100% DOWNLIGHT WITH ACRYLIC RECESSED SMOOTH DIFFUSER, 80 CRI, 0-10VDC DIMMING DRIVER AND DAYLIGHT DIMMING SENSOR. LIGHT SOURCE DATA BASED ON 6 FOOT SECTION. LUMENS LISTED IS PER LINEAR FOOT.	48 VA
LP048L	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES FINELITE HP-4 SERIES	SUSPENDED	1	48 W	SOLID STATE LED	600 lm	277 V	4" BY 8-FOOT LED LINEAR PENDANT SLOT FIXTURE; SUSPEND FIXTURE SO BOTTOM OF FIXTURE IS SAME HEIGHT AS ADJACENT CLOUD, 100% DOWNLIGHT WITH ACRYLIC RECESSED SMOOTH DIFFUSER, 80 CRI, 0-10VDC DIMMING DRIVER AND DAYLIGHT DIMMING SENSOR. LIGHT SOURCE DATA BASED ON 8 FOOT SECTION. LUMENS LISTED IS PER LINEAR FOOT.	48 VA
LR2	METALUX WNLED SERIES DAY-BRITE OWL SERIES LITHONIA SBL SERIES COLUMBIA LAW SERIES	SUSPENDED	1	48 W	LED	4000 lm	277 V	4-FOOT LED WRAP AROUND FIXTURE, ACRYLIC PRISMATIC DIFFUSER, 0-10VDC DIMMING. IF SUSPENDED, INSTALL AT 8-FOOT AFF WITH CONDUIT STEMS (UNO).	27 VA
LR2X	METALUX WNLED SERIES DAY-BRITE OWL SERIES LITHONIA SBL SERIES COLUMBIA LAW SERIES	SUSPENDED	1	48 W	LED	4000 lm	277 V	4-FOOT LED WRAP AROUND FIXTURE, ACRYLIC PRISMATIC DIFFUSER, 0-10VDC DIMMING, WITH EMERGENCY TRANSFER DEVICE. IF SUSPENDED, INSTALL AT 8-FOOT AFF WITH CONDUIT STEMS (UNO).	27 VA

LUMINAIRE SCHEDULE

PLAN TYPE	MANUFACTURER/CATALOG	MOUNTING	LAMPS NO.	LAMPS WATTS	LAMPS TYPE	LAMPS LUMENS	APPLIED VOLTAGE	DESCRIPTION	VA LOAD
LRV4	LITHONIA VAP LED SERIES METALUX 4VT2 LED SERIES COLUMBIA LXEM SERIES	SUSPENDED	1	64 W	LED	8000 lm	277 V	4-FOOT LED VANDAL RESISTANT, GASKETED, WRAP AROUND FIXTURE FOR HIGH ABUSE AREAS WITH CLEAR POLYCARBONATE LENS. WIDE DISTRIBUTION. PROVIDE WITH AIRCRAFT CABLE HANGERS AND ASSOCIATED HARDWARE. MOUNT AT 10'-0" ABOVE FINISH FLOOR U.N.O.	62 VA
LRV4X	LITHONIA VAP LED SERIES METALUX 4VT2 LED SERIES COLUMBIA LXEM SERIES	SUSPENDED	1	64 W	LED	8000 lm	277 V	4-FOOT LED VANDAL RESISTANT, GASKETED, WRAP AROUND FIXTURE FOR HIGH ABUSE AREAS WITH CLEAR POLYCARBONATE LENS. WIDE DISTRIBUTION. PROVIDE WITH AIRCRAFT CABLES AND ASSOCIATED HARDWARE. CONNECT TO EMERGENCY TRANSFER DEVICE. MOUNT AT 10'-0" A.F.F. (U.N.O.)	62 VA
LS1	COOPER INVUE	POLE TOP	1	270 W	LED	29800 lm	277 V	OUTDOOR POLE MOUNTED LED LIGHT FIXTURE, DIE CAST ALUMINUM HOUSING, SPIDER MOUNT, BLACK, TYPE 3 DISTRIBUTION. MOUNT ON A 30'-0" STRAIGHT ROUND ALUMINUM POLE.	270 VA
LS2	COOPER INVUE	POLE TOP	1	270 W	LED	13468 lm	277 V	OUTDOOR POLE MOUNTED LED LIGHT FIXTURE, DIE CAST ALUMINUM HOUSING, SPIDER MOUNT, BLACK, TYPE 3 DISTRIBUTION. MOUNT ON A 12'-0" STRAIGHT ROUND ALUMINUM POLE.	270 VA
LT044H	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES	RECESSED	1	40 W	LED	1000 lm	277 V	4" BY 4-FOOT LED SLOT FIXTURE, MOUNTING METHOD PER PLANS, 100% DOWNLIGHT WITH ACRYLIC FLUSH SMOOTH DIFFUSER, 80 CRI, 0-10VDC DIMMING DRIVER. LUMENS LISTED IS PER LINEAR FOOT.	40 VA
LT044HX	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES	RECESSED	1	40 W	LED	4000 lm	277 V	4" BY 4-FOOT LED SLOT FIXTURE, MOUNTING METHOD PER PLANS, 100% DOWNLIGHT WITH ACRYLIC FLUSH SMOOTH DIFFUSER, 80 CRI, 0-10VDC DIMMING DRIVER WITH EMERGENCY TRANSFER DEVICE.	40 VA
LT046H	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES FINELITE HP-4 SERIES	RECESSED	1	60 W	SOLID STATE LED	1000 lm	277 V	4" BY 6-FOOT LED LINEAR RECESS SLOT FIXTURE; MOUNTING TO BE FLUSH WITH CEILING, 100% DOWNLIGHT WITH ACRYLIC FLUSH SMOOTH DIFFUSER, 80 CRI, LUMENS LISTED IS PER LINEAR FOOT.	48 VA
LT046HX	MARK ARCHITECTURAL SLOT 4 LED SERIES. WITH EMERGENCY TRANSFER DEVICE. LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES FINELITE HP-4 SERIES	RECESSED	1	24 W	SOLID STATE LED	6000 lm	277 V	4" BY 6-FOOT LED LINEAR RECESS SLOT FIXTURE; MOUNTING TO BE FLUSH WITH CEILING, 100% DOWNLIGHT WITH ACRYLIC FLUSH SMOOTH DIFFUSER, 80 CRI, LIGHT SOURCE DATA BASED ON 4 FOOT SECTION.	24 VA
LT046L	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES FINELITE HP-4 SERIES	RECESSED	1	48 W	SOLID STATE LED	800 lm	277 V	4" BY 6-FOOT LED LINEAR RECESS SLOT FIXTURE; MOUNTING TO BE FLUSH WITH CEILING, 100% DOWNLIGHT WITH ACRYLIC FLUSH SMOOTH DIFFUSER, 80 CRI, LUMENS LISTED IS PER LINEAR FOOT.	48 VA
LT048H	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES FINELITE HP-4 SERIES	RECESSED	1	80 W	SOLID STATE LED	1000 lm	277 V	4" BY 8-FOOT LED LINEAR RECESS SLOT FIXTURE; MOUNTING TO BE FLUSH WITH MOUNTING SURFACE., 100% DOWNLIGHT WITH ACRYLIC RECESSED SMOOTH DIFFUSER, 80 CRI, 0-10VDC DIMMING DRIVER AND DAYLIGHT DIMMING SENSOR. LIGHT SOURCE DATA BASED ON 8 FOOT SECTION. LUMENS LISTED IS PER LINEAR FOOT.	80 VA
LT048HX	MARK ARCHITECTURAL SLOT 4 LED SERIES LUMENWERX VIA 4 SERIES LITECONTROL MOD 4 LED SERIES	RECESSED	1	40 W	LED	4000 lm	277 V	4" BY 8-FOOT LED SLOT FIXTURE, MOUNTING METHOD PER PLANS, 100% DOWNLIGHT WITH ACRYLIC FLUSH SMOOTH DIFFUSER, 80 CRI, 0-10VDC DIMMING DRIVER WITH EMERGENCY TRANSFER DEVICE.	40 VA
LTFW1	FAIL-SAFE TRISEAL CLM SERIES KENALL CSEDO SERIES KURTZON LIGHTING FP/EZ SERIES	RECESSED	1	52 W	LED	4379 lm	277 V	1 BY 4-FOOT LED TROFFER, INVERTED 0.187-INCH POLYCARBONATE LENS WITH UV ABSORBING OVERLAY, LISTED FOR WET LOCATIONS, IP65 RATED, NSF LISTED, FLANGE KIT.	52 VA
LTFW1X	FAIL-SAFE TRISEAL CLM SERIES KENALL CSEDO SERIES KURTZON LIGHTING FP/EZ SERIES	RECESSED	1	52 W	LED	4379 lm	277 V	1 BY 4-FOOT LED TROFFER, INVERTED 0.187-INCH POLYCARBONATE LENS WITH UV ABSORBING OVERLAY, LISTED FOR WET LOCATIONS, IP65 RATED, FLANGE KIT, WITH EMERGENCY TRANSFER DEVICE.	52 VA
LTK1	TIMES SQUARE XT13 SERIES BRUCK LIGHTING Z25 SERIES SPECTRUM SRTVLEDXT SERIES LUMENPULSE LATSL SERIES CONTECH LIGHTING NCTL	TRACK	1	25 W	LED	1300 lm	120 V	LINE VOLTAGE LED TRACK HEAD, SPOT DISTRIBUTION, 95+ CRI, 0-10VDC DIMMING. PROVIDE SINGE-CIRCUIT OR 2-CIRCUIT TRACK PER DRAWINGS, LENGTH AND CONFIGURATION PER DRAWINGS. PROVIDE ALL REQUIRED ACCESSORIES, FITTINGS, ETC. FOR A COMPLETE INSTALLATION. TRACK HEADS AND TRACK TO BE WHITE IN COLOR.	25 VA
LTT1	LUMINII LINE LED SERIES	RECESSED	1	8 W	LED	950 lm	277 V	LUMINII LED TAPE LIGHT, ALUMINUM MOUNTING CHANNEL AND FLAT FROSTED LENS, 4000K, 950 LUMENS PER LINEAR FOOT, MOUNTED SO BOTTOM OF LENS IS FLUSH WITH BOTTOM AND VERTICAL FACE OF ADJACENT CLOUDS, PROVIDE ALL MOUNTING ACCESSORIES AS REQUIRED FOR A COMPLETE SY	8 VA
LTT1X	LUMINII LINE LED SERIES	RECESSED	1	8 W	LED	950 lm	277 V	LUMINII LED TAPE LIGHT, ALUMINUM MOUNTING CHANNEL AND FLAT FROSTED LENS, 4000K, 950 LUMENS PER LINEAR FOOT, MOUNTED SO BOTTOM OF LENS IS FLUSH WITH BOTTOM AND VERTICAL FACE OF ADJACENT CLOUDS. PROVIDE ALL MOUNTING ACCESSORIES AS REQUIRED FOR A COMPLETE SY	8 VA
LWW1	LUMINOS GLOBAL LIGHTING SCN SERIES	SURFACE WALL	1	30 W	LED	2700 lm	277 V	WALL MOUNTED DOWNLIGHT WITH A NARROW BEAM OF BLUE LIGHT TO ILLUMINATE THE COLUMN. COLOR SELECTED FROM MANUFACTURERS STANDARD COLORS.	30 VA
LWW2	KIRLIN LRR-08471-465 SERIES	RECESSED	1	25 W	LED	658 lm	277 V	8-INCH RECESSED DOWN LIGHT WITH A NARROW BEAM OF BLUE LIGHT TO ILLUMINATE ALCOVE.	25 VA
RL1	LUMINII KURBA SERIES	RECESSED	1	80 W	SOLID STATE LED	100 lm	277 V	COLOR CHANGING ROPE LIGHT TO BE INSTALLED,IN CASEWORK FRAMING. PROVIDE ALL NECESSARY MOUNTING HARDWARE, DRIVERS AND DMX CONTROLS AS REQUIRED FOR A COMPLETE SYSTEM. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND LENGTHS.	80 VA
XC	SURE-LITES CX SERIES CHLORIDE 55 LINE SERIES LITHONIA SIGNATURE SERIES DUAL-LITE SEMPRA SERIES OR A/E APPROVED EQUAL	SURFACE CEILING	1	3 W	RED LED	0 lm	277 V	CAST ALUMINUM AC ONLY EXIT SIGN, SINGLE FACE, DIRECTIONAL ARROWS INDICATED, WHITE HOUSING. REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.	3 VA
XVW	SURE-LITES UX SERIES CHLORIDE 60 LINE SERIES LITHONIA LV SERIES DUAL-LITE SEWL SERIES	SURFACE WALL	1	3 W	RED LED	0 lm	277 V	CAST ALUMINUM, VANDAL RESISTANT AC ONLY EXIT SIGN, SINGLE FACE, DIRECTIONAL ARROWS INDICATED, WHITE HOUSING, LISTED FOR WET LOCATIONS. REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.	3 VA
XW	SURE-LITES CX SERIES CHLORIDE 55 LINE SERIES LITHONIA SIGNATURE SERIES DUAL-LITE SEMPRA SERIES	SURFACE WALL	1	3 W	RED LED	0 lm	277 V	CAST ALUMINUM AC ONLY EXIT SIGN, SINGLE FACE, DIRECTIONAL ARROWS INDICATED, WHITE HOUSING. REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.	3 VA

LUMINAIRE SCHEDULE - GENERAL NOTES

1. SEE SPECIFICATIONS FOR DRIVER REQUIREMENTS.
2. FOR ALL DOWNLIGHTING FIXTURES, PROVIDE REQUIRED MOUNTING HARDWARE FOR MOUNTING IN LAY-IN TYPE CEILINGS.
3. CONTRACTOR TO VERIFY TYPES AND QUANTITY OF LIGHT FIXTURES REQUIRING EMERGENCY TRANSFER DEVICES AND PROVIDE REQUIRED QUANTITY OF EMERGENCY TRANSFER DEVICES, LABOR, MATERIAL, ETC. IN THE PROJECT BID FOR FIELD INSTALLATION OF EMERGENCY TRANSFER DEVICES.
4. LIGHT FIXTURE SUBMITTALS TO INCLUDE DATA SHEETS FOR ALL FIXTURE TYPES, INCLUDING ADDITIONAL DATA SHEETS FOR DRIVER COMBINATIONS REQUIRED TO MEET THE INSTALLATION REQUIREMENTS OF THE VARIOUS FIXTURE TYPES INDICATED IN THE REMARKS COLUMN OF THE FIXTURE SCHEDULES OR ON THE DRAWINGS. SUBMITTALS SHALL ALSO INDICATE COLOR FOR ANY CUSTOM COLOR LIGHT FIXTURES.

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CONSTRUCTION DOCUMENTS

BRIAN W. BUTLER REGISTERED No. PE10800008 STATE OF INDIANA PROFESSIONAL ENGINEER

DRAWN BY: MMS

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	1.25.2022

LUMINAIRE SCHEDULES

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TECHNOLOGY SYMBOLS LEGEND

SYMBOL	DESCRIPTION	ROUGH-IN REQUIREMENTS	MOUNTING HEIGHT (UNO)	ROUGH-IN DETAIL	TECHNOLOGY DETAIL
xD ▽	TELECOMMUNICATIONS OUTLET. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG OR DOUBLE GANG MUD RING. PROVIDE TWO (2) 1" C.'S STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+18"	2/T5.01	1/T5.02
W xD ▽	TELECOMMUNICATIONS OUTLET WITH WALL PLATE. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE TWO (2) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+44"	1/T5.01	1/T5.02
VO xD	VIDEO OUTPUT LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE TWO (2) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+96"	3/T5.01	3/T5.03
WAP xD	CEILING MOUNTED WIRELESS ACCESS POINT LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 4" SQUARE BOX WITH BLANK METAL COVER PLATE. METAL BOX SHALL BE SUPPORTED FROM WALL ABOVE ACCESSIBLE CEILING), OR STRUCTURE, OR UNISTRUT. METAL BOX SHALL NOT BE INSTALLED LOOSE ON CEILING TILES.	-	-	-
WAP xD	WALL MOUNTED WIRELESS ACCESS POINT LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE ONE (1) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+96"	1/T5.01	-
	TELECOMMUNICATIONS CONDUIT SLEEVE. CONDUIT SIZE SHALL BE 2" UNLESS NOTED OTHERWISE.	-	-	-	-
	? WIDE WIRE MESH CABLE TRAY PROVIDED BY ELECTRICAL CONTRACTOR. REFER TO SECTION 27 05 28 FOR MORE INFORMATION.	-	-	-	-

SECURITY SYMBOLS LEGEND

SYMBOL	DESCRIPTION	ROUGH-IN REQUIREMENTS	MOUNTING HEIGHT (UNO)	ROUGH-IN DETAIL	TECHNOLOGY DETAIL
CR	CARD READER.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE TWO (2) 1" C.'S STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+44"	4, 5/T5.01	4, 5 /T5.01
EL	ELECTRONIC LATCH.	COORDINATE ROUGH-IN AND CONDUIT INTO DOOR FRAME WITH DOOR HARDWARE MANUFACTURER.	-	4, 5/T5.01	4, 5 /T5.01
ES	ELECTRONIC STRIKE.	COORDINATE ROUGH-IN AND CONDUIT INTO DOOR FRAME WITH DOOR HARDWARE MANUFACTURER.	-	4, 5/T5.01	4, 5 /T5.01
DC	DOOR CONTACT.	COORDINATE ROUGH-IN AND CONDUIT INTO DOOR FRAME WITH DOOR HARDWARE MANUFACTURER.	-	4, 5/T5.01	4, 5 /T5.01
xD J	ABOVE CEILING JUNCTION BOX FOR ACCESS CONTROL. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	12"X12"X6" JUNCTION BOX WITH HINGED COVER IN ACCESSIBLE CEILING SPACE.	-	4, 5/T5.01	4, 5 /T5.01
xD	CEILING MOUNTED IP VIDEO SURVEILLANCE CAMERA LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 4" SQUARE BOX WITH BLANK METAL COVER PLATE. METAL BOX SHALL BE SUPPORTED FROM WALL ABOVE ACCESSIBLE CEILING), OR STRUCTURE, OR UNISTRUT. METAL BOX SHALL NOT BE INSTALLED LOOSE ON CEILING TILES.	-	-	-
xD	WALL MOUNTED IP VIDEO SURVEILLANCE CAMERA LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE ONE (1) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+96"	1/T5.01	-
MS xD	CEILING MOUNTED MULTISENSOR IP VIDEO SURVEILLANCE CAMERA LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 4" SQUARE BOX WITH BLANK METAL COVER PLATE. METAL BOX SHALL BE SUPPORTED FROM WALL ABOVE ACCESSIBLE CEILING), OR STRUCTURE, OR UNISTRUT. METAL BOX SHALL NOT BE INSTALLED LOOSE ON CEILING TILES.	+96"	-	-
MS xD	WALL MOUNTED MULTISENSOR IP VIDEO SURVEILLANCE CAMERA LOCATION. WHEN INDICATED WITH xD, x INDICATES THE QUANTITY OF COMMUNICATIONS COPPER HORIZONTAL CABLE.	PROVIDE 2-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE ONE (1) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRINGS.	+96"	1/T5.01	-

INTERCOMMUNICATIONS AND PROGRAM SYSTEM SYMBOLS LEGEND

SYMBOL	DESCRIPTION	ROUGH-IN REQUIREMENTS	MOUNTING HEIGHT (UNO)	ROUGH-IN DETAIL	TECHNOLOGY DETAIL
IC	RECESSED CEILING SPEAKER.	-	+44"	-	2/T5.02
IC VC	RECESSED CEILING SPEAKER W/ VOLUME CONTROL KNOB	-	-	-	2/T5.02
IC PD	PENDANT CEILING SPEAKER	-	-	-	2/T5.02
IC	WALL MOUNTED METAL BOX SPEAKER	PROVIDE 1-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE ONE (1) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	+9'-0"	1/T5.01	2/T5.02
IC	WALL MOUNTED HORN LOUDSPEAKER	PROVIDE 1-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE ONE (1) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	+9'-0"	1/T5.01	2/T5.02
VC	WALL MOUNTED VOLUME CONTROL PLATE	PROVIDE 1-GANG, 3.5" DEEP BOX WITH SINGLE GANG MUD RING. PROVIDE ONE (1) 1" C. STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	+44"	1/T5.01	2/T5.02

TELECOMMUNICATIONS COLOR LEGEND

SYSTEM	TERMINATION (RJ-45)	CABLE	PATCH CABLE
DATA	BLUE	BLUE	BLUE
WIRELESS	WHITE	WHITE	WHITE
IP CAMERA	PURPLE	PURPLE	PURPLE

REFERENCE SYMBOLS

SECTION INDICATOR:	REFERENCE SECTION LOCATION THROUGH AN AREA FOR ADDITIONAL INFORMATION.	KEYNOTE INDICATOR:	REFERENCE SHEET KEYNOTE LOCATION FOR ADDITIONAL INFORMATION.
SECTION LOCATION IN DRAWING MODULE; BEYOND AREA EXTENSION; PLAN; SECTION LOCATION AT SUBSET SHEET		KEYNOTE INDICATORS; NUMERIC CHARACTER RELATES TO ITEM; POINT LEADER; AREA LEADER; LINE LEADER	
DETAIL INDICATOR:	REFERENCE DETAIL LOCATION FOR ADDITIONAL INFORMATION.	DRAWING BLOCK TITLE INDICATOR:	REFERENCE DRAWING MODULE LOCATION FOR ADDITIONAL INFORMATION.
LARGE SCALE VIEW LOCATION IN DRAWING MODULE; DETAIL LOCATION IN DRAWING MODULE; LARGE SCALE VIEW LOCATION AT SUBSET SHEET; DETAIL LOCATION AT SUBSET SHEET		DRAWING MODULE LOCATION (IDENTIFYING LOWER LEFT OF MULTIPLE MODULES); DRAWING BLOCK TITLE; SCALE: 1/8" = 1'-0"; NUMERIC SCALE; NORTH ARROW	
MATCH LINE INDICATOR:	REFERENCE SHEET LOCATION FOR ADDITIONAL INFORMATION.	REVISION INDICATOR:	REFERENCE TITLE BLOCK LOCATION FOR ADDITIONAL INFORMATION.
FLOOR PLAN OVERLAP; BEYOND AREA EXTENSION; SEE XXXX; REFER TO ADDITIONAL SHEET FOR CONTINUATION; PLAN		REVISION INDICATOR; REVISION CLOUD	
EQUIPMENT INDICATOR:	REFERENCE SCHEDULE LOCATION FOR ADDITIONAL INFORMATION.	DIFFUSER, GRILLE, REGISTER INDICATOR:	REFERENCE SCHEDULE LOCATION FOR ADDITIONAL INFORMATION.
TU-XI.## NUMERIC CHARACTER RELATES TO ITEM; ALPHANUMERIC CHARACTER RELATES TO BUILDING LEVEL (OPTIONAL); ALPHANUMERIC CHARACTER RELATES TO ASSOCIATED AIR HANDLER (OPTIONAL); EQUIPMENT TYPE		XXX-XXX; SCHEDULE TYPE; AIRFLOW (CUBIC FEET PER MINUTE)	

ABBREVIATIONS AND TERMS

&	AND	LBS	POUNDS
°F	DEGREES FAHRENHEIT	MAX	MAXIMUM
AFC	ABOVE FINISHED COUNTER	MC	MECHANICAL CONTRACTOR
AFF	ABOVE FINISHED FLOOR	MFR	MANUFACTURER
AFG	ABOVE FINISHED GRADE	MIN	MINIMUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MISC	MISCELLANEOUS
ARCH	ARCHITECT	MTD	MOUNTED
AVG	AVERAGE	NA	NOT APPLICABLE
BAS	BUILDING AUTOMATION SYSTEM	NEC	NATIONAL ELECTRIC CODE
BLDG	BUILDING	NIC	NOT IN CONTRACT
BMS	BUILDING MANAGEMENT SYSTEM	NOM	NOMINAL
BSMT	BASEMENT	NTS	NOT TO SCALE
C	CONDUIT	OD	OUTSIDE DIAMETER
CLG	CEILING	OF/CI	OWNER FURNISHED/CONTRACTOR INSTALLED
DWG	DRAWING	PVC	POLYVINYL CHLORIDE CONDUIT/PIPE
EA	EACH	RGS	RIGID GALVANIZED CONDUIT
EC	ELECTRICAL CONTRACTOR	RM	ROOM
EL	ELEVATION	SF	SQUARE FOOT
EMT	ELECTRICAL METALLIC TUBING	SPEC	SPECIFICATION
ETR	EXISTING TO REMAIN	SQ	SQUARE
EX	EXISTING	STD	STANDARD
FLR	FLOOR	TBD	TO BE DETERMINED
FT	FOOT, FEET	TBI	TO BE INSTALLED
G	GROUND	TBR	TO BE REMOVED
GC	GENERAL CONTRACTOR	TC	TEMPERATURE CONTROLS
GRD	GROUND	TCC	TEMPERATURE CONTROLS CONTRACTOR
GND	GROUND	TEMP	TEMPERATURE
HORIZ	HORIZONTAL	TYP	TYPICAL
HR	HOUR(S)	UON	UNLESS OTHERWISE NOTED
Hz	HERTZ	VERT	VERTICAL
ID	INSIDE DIAMETER	WP	WEATHERPROOF
IN	INCH, INCHES	W/	WITH
INT	INTERIOR	W/O	WITHOUT

TECHNOLOGY ADDITIONAL CABLING NOTE

A. PROVIDE TEN (10) ADDITIONAL 200 FOOT COPPER COMMUNICATIONS COPPER HORIZONTAL CABLING RUNS. INCLUDE JACKS AT BOTH ENDS, LABELING, AND TESTING. THE ADDITIONAL DROPS ARE TO BE INSTALLED AS DIRECTED BY THE ENGINEER. REFER TO SPECIFICATION 271513 FOR MORE INFORMATION.

TECHNOLOGY GENERAL NOTES

A. DRAWINGS ARE DIAGRAMMATIC. ALL DIMENSIONS SHOWN ARE APPROXIMATE. ALL LOCATIONS SHALL BE FIELD VERIFIED.

B. CONTRACT DOCUMENTS CONSIST OF BOTH THE PROJECT MANUAL AND DRAWINGS, AND BOTH ARE INTENDED TO BE COMPLIMENTARY. ANYTHING APPEARING ON EITHER MUST BE EXECUTED THE SAME AS IF SHOWN ON BOTH.

C. THE CONTRACTOR SHALL INCLUDE IN BID PROPOSAL ALL COSTS REQUIRED TO COMPLETELY AND PROPERLY INSTALL ALL WORK REQUIRED FOR THE PROJECT, AND SHALL EXAMINE THE SCOPE OF WORK OF OTHER TRADES PRIOR TO SUBMITTING A BID PROPOSAL.

D. CONSTRUCTION DOCUMENTS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE, HOWEVER, SYSTEMS HAVE BEEN SHOWN DIAGRAMMATICALLY AND IN SOME CASES, ENLARGED FOR CLARITY. ANY OFFSETS, ADDITIONAL FITTINGS, AND/OR APPURTENANCES REQUIRED TO PROVIDE A COMPLETE AND COORDINATED SYSTEM SHALL BE BORNE BY THE CONTRACTOR.

E. THE TECHNOLOGY DRAWINGS ARE OF EQUAL IMPORTANCE WITH THE ARCHITECTURAL AND ENGINEERING DRAWINGS IN DEFINING THE WORK OF THE CONTRACT DOCUMENTS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK WITH THE ARCHITECTURAL AND ENGINEERING DRAWINGS BEFORE THE INSTALLATION OF ENGINEERING WORK. SHOULD THERE BE A DISCREPANCY BETWEEN THE ARCHITECTURAL AND ENGINEERING DRAWINGS AND THE TECHNOLOGY DRAWINGS THAT WOULD CAUSE AN AWKWARD OR IMPROPER INSTALLATION, THE DISCREPANCY SHALL BE BROUGHT TO THE ARCHITECTS/ENGINEERS ATTENTION FOR CLARIFICATION PRIOR TO INSTALLATION OF SAID WORK. ANY WORK INSTALLED IN CONFLICT WITH THE ARCHITECTURAL AND ENGINEERING DRAWINGS SHALL BE CORRECTED BY THE CONTRACTOR AT HIS EXPENSE AND AT NO ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER.

F. DO NOT SCALE THE DRAWINGS. THE DRAWINGS ARE NOT NECESSARILY TO SCALE. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AT THE JOB SITE PRIOR TO THE START OF CONSTRUCTION. IF DISCREPANCIES ARE FOUND, THE ARCHITECT/ENGINEER SHALL BE NOTIFIED FOR CLARIFICATION BEFORE COMMENCING THE WORK. EXPLICIT DIMENSIONS SHALL HAVE PRECEDENCE OVER SCALE.

G. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO BIDDING OR BEGINNING WORK ON THIS PROJECT.

H. DETAILS NOT SHOWN ARE SIMILAR IN CHARACTER TO THOSE SHOWN. WHERE SPECIFIC DIMENSIONS, DETAILS OR DESIGN INTENT CANNOT BE DETERMINED, CONSULT THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK.

I. ANY DETAILS, SYSTEMS AND/OR MATERIALS WHICH ARE PROPOSED TO BE CHANGED MUST FIRST BE REVIEWED BY THE OWNER AND ARCHITECT/ENGINEER PRIOR TO THE PREPARATION OF SHOP DRAWINGS.

J. ALL WORK SHALL BE IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE - LATEST EDITION ADOPTED BY STATE HAVING JURISDICTION, AND THE STATE HAVING JURISDICTION ELECTRICAL CODE AMENDMENTS, LOCAL/MUNICIPAL CODES, AND THE AUTHORITY HAVING JURISDICTION.

K. CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR INCORRECT WORK, OR FOR INFRINGEMENT UPON OTHERS WORK, DUE TO A LACK OF COORDINATION.

L. COORDINATE LOCATION OF ALL DEVICES TO BE INSTALLED IN CEILINGS WITH THE ARCHITECTURAL REFLECTED CEILING PLANS. NOTIFY ENGINEER OF AN CONFLICTS PRIOR TO INSTALLATION.

M. CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING THEIR AREAS OF CONSTRUCTION. PROJECT AREAS SHALL BE THOROUGHLY CLEANED AND TRASH DISPOSED OF AT THE END OF EACH WORK DAY. THE OWNER'S FACILITIES SHALL NOT BE USED FOR TRASH DISPOSAL.

N. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THEIR WORK FROM DUST AND DEBRIS. CONTRACTOR SHALL PROVIDE DUST BARRIERS FOR ALL TECHNOLOGY EQUIPMENT AS REQUIRED TO PROTECT THE TECHNOLOGY EQUIPMENT.

O. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL SURFACES AND FINISHED OF THE CONSTRUCTION SITE DURING THE INSTALLATION OF THE TECHNOLOGY SYSTEMS. DAMAGED SURFACES OR FINISHES RESULTING FROM THE PERFORMANCE OF THE WORK OR NEGLIGENCE SHALL BE REPAIRED AT NO COST TO THE OWNER BY THE RESPONSIBLE CONTRACTOR. FINISHES AND SURFACES SHALL BE MADE TO MATCH THE EXISTING FINISHES OR SURFACES TO THE SATISFACTION OF THE OWNER AND ARCHITECT/CONSTRUCTION MANAGER.

TECHNOLOGY PATHWAY NOTES

1. ALL HORIZONTAL CABLING RUNS SHALL BE SUPPORTED NEATLY WITH CABLE TRAY, CONDUITS, OR J-HOOKS. ALL HORIZONTAL CABLING THAT IS NOT INSTALLED IN CABLE TRAY OR CONDUIT SHALL BE SUPPORTED WITH J-HOOKS. CABLES SHALL NOT LIE ON THE STRUCTURAL STEEL OR SYSTEMS OF THE FACILITY.
2. ALL CONDUIT PENETRATIONS SHALL BE SEALED WITH APPROPRIATE CONDUIT SEALING MATERIAL AND SHALL MATCH FIRE RATING OF BARRIER BEING PENETRATED.
3. FIELD VERIFY LOCATIONS OF BUILDING EXPANSION JOINTS WHEN ROUTING CONDUIT. ALL CONDUITS CROSSING EXPANSION JOINTS SHALL BE INSTALLED WITH EXPANSION FITTINGS. EXPANSION FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE NEC, AND MANUFACTURER'S WRITTEN RECOMMENDATIONS.
4. WHEN CABLE TRAY IS SHOWN ON THE PLANS AND PORTIONS OF CABLE TRAY CANNOT BE INSTALLED DUE TO CONFLICT WITH STRUCTURE, THE CONTRACTOR SHALL PROVIDE (2) 4" C. WITH INSULATED BUSHINGS THAT OVERLAP 1" INTO THE TRAY.
5. CONDUITS 2" AND LARGER THAT PENETRATE EXTERIOR WALLS SHALL USE LINK-SEALS.
6. DEVICES IN GENERAL SHALL BE CENTERED IN WALL SPACE IN WHICH THEY ARE INSTALLED OR THEY SHALL BE SPACED SYMMETRICALLY (FOR EXAMPLE, CENTER DEVICES WHEN MOUNTED ON FACE OF COLUMNS).
7. COORDINATE AND VERIFY LOCATIONS OF DEVICES WITH BLOCK COURSING, FINISH MATERIALS, CASEWORK, ETC. PRIOR TO ROUGH-IN.
8. ALL DEVICE BOXES SHALL BE FLUSH MOUNTED AND ALL RACEWAYS SHALL BE CONCEALED UNLESS NOTED OTHERWISE. CONTRACTOR SHALL CUT AND PATCH EXISTING WALLS WITH EXTREME CAUTION, SO AS TO MINIMIZE INVASIVENESS OF INSTALLATION. ROUTE RACEWAYS SO AS TO MINIMIZE THE AMOUNT OF CUTTING AND PATCHING REQUIRE. PATCHING SHALL COMPLY WITH ALL BID DOCUMENT REQUIREMENTS.
9. CONDUIT RUNS SHALL HAVE NO MORE THAN 180 DEGREES OF BENDS WITHOUT A PULL BOX. WHERE CONDUIT IS SHOWN AND/OR SPECIFIED, CONTRACTOR SHALL PROVIDE ALL PULL BOXES SHOWN ON THE DRAWINGS AND ADDITIONAL PULL BOXES AS FOLLOWS:
   A. EVERY 180 DEGREES OF CONDUIT BEND
   B. EVERY 100 FEET OF CONDUIT PATH
10. PROVIDE PLASTIC INSULATED BUSHINGS ON ALL CONDUIT STUB'S. BUSHINGS SHALL ALSO BE PROVIDED FOR ALL CONDUITS WHETHER ABOVE OR BELOW CEILING OR AT FLOOR LEVEL. IT IS THE COMMUNICATIONS CABLING CONTRACTORS RESPONSIBILITY TO ENSURE BUSHINGS HAVE BEEN PROVIDED ON ALL CONDUITS PRIOR TO PULLING CABLES. IF CONDUITS ARE FOUND TO BE WITHOUT BUSHINGS, COMMUNICATIONS CABLING CONTRACTOR SHALL REMOVE CABLING, PROVIDE BUSHINGS AND REPLACE WITH NEW CABLING.

FIRESTOPPING NOTES

1. THE CONTRACTOR SHALL FIRESTOP ALL PENETRATIONS OF ALL FLOORS AND ALL WALLS WHICH EXTEND TO THE UNDERSIDE OF THE FLOOR OR ROOF DECK ABOVE. FIRESTOPPING SHALL BE ACCOMPLISHED AFTER ALL CABLES ARE PULLED (ALL SYSTEMS) USING UL CLASSIFIED SYSTEMS WITH FIRE RATING EQUAL TO OR GREATER THAN THE FIRE RATING OF THE FLOOR OR WALL ASSEMBLY PENETRATED. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS. THE CONTRACTOR SHALL SUBMIT A MANUFACTURER'S STANDARD DETAIL FOR EACH TYPE OF FLOOR AND WALL PENETRATION REQUIRED FOR THIS PROJECT. ALL OTHER PENETRATIONS OR OPENINGS IN NON-FIRE RATED WALLS SHALL BE REPAIRED AND SEALED WITH MATERIALS TO MATCH THE EXISTING CONSTRUCTION.

LINETYPE DESIGNATIONS

DEMOLITION	– – – – – – – – – – – – – – – – – – – –
EXISTING	———————————————
NEW WORK	———————————————
FUTURE	– – – – – – – – – – – – – – – – – – – –

NOT ALL NOTES, DESIGNATORS, SYMBOLS OR ABBREVIATIONS MAY APPLY TO THIS PROJECT

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CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

FANNING HOWEY

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350 E NEW YORK ST #300, INDIANAPOLIS, IN 46204

CONSTRUCTION DOCUMENTS

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Matt L Minnich
BICSI ID # 162967
EXPIRES 12-31-25
RCDD

DRAWN BY: ODJ

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

SYMBOLS AND ABBREVIATIONS

T000

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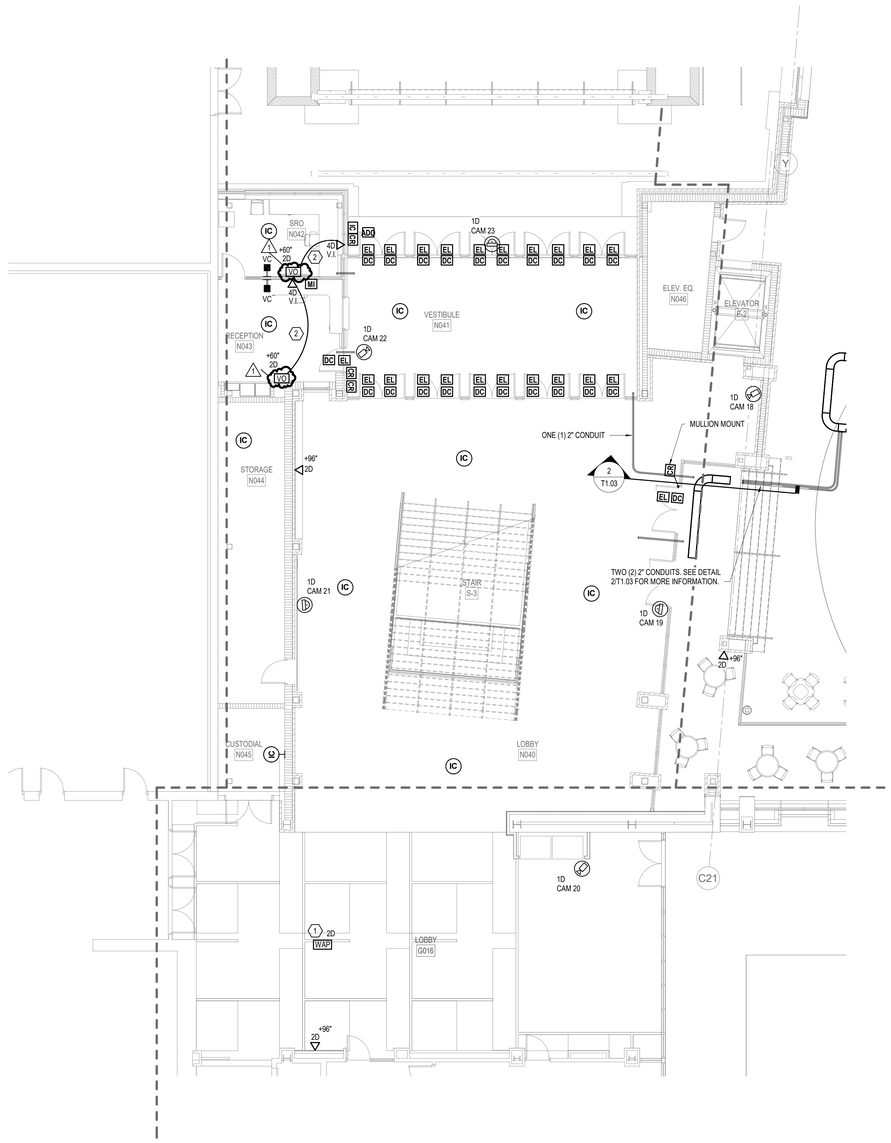
CAMERA DESIGN SCHEDULE - SHEET T1.03						
CAMERA NUMBER	TELECOM ROOM	MODEL	LENS	RESOLUTION	MOUNTING	NOTES
CAM 18	IDF-N2	XND-8080RV	Varifocal	5MP	CEILING MOUNT	
CAM 19	IDF-N2	PNM-9000VD	3.7mm	2 x 5MP	CEILING MOUNT	
CAM 20	IDF-N2	XND-8080RV	Varifocal	5MP	CEILING MOUNT	
CAM 21	IDF-N2	PNM-9000VD	3.7mm	2 x 5MP	CEILING MOUNT	
CAM 22	IDF-N2	XND-8080RV	Varifocal	5MP	CEILING MOUNT	
CAM 23	IDF-N2	PNM-9000VD	3.7mm	2 x 5MP	CEILING MOUNT	

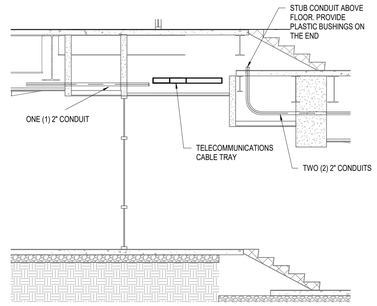
SHEET KEYNOTES

1 PROVIDE CATEGORY 6A DROPS FOR THE WIRELESS ACCESS POINT. PROVIDE 20FT. SLACK LOOP COILED NEATLY AND SUPPORTED ABOVE THE CEILING. TERMINATE CABLES WITH RJ45 MODULAR JACKS AND TEST PER SPECIFICATIONS. NOTE LOCATION ON THE RECORD DRAWINGS AND MARK LOCATION ON THE CEILING WITH A GREEN DOT STICKER.

2 SEE DETAIL 2/T5.03 FOR MORE INFORMATION ON WIRING BETWEEN VIDEO INPUT AND VIDEO OUTLET.



1 UNIT N3 - LOWER LEVEL TECHNOLOGY PLAN
1/8" = 1'-0"



2 NATATORIUM TECHNOLOGY CONDUIT RISER - UNIT N3
1/4" = 1'-0"

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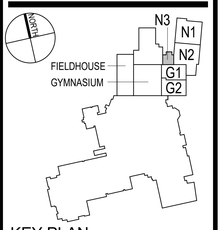

KEY PLAN

CONSTRUCTION DOCUMENTS

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Matt L Minnich
BICSI ID #162967
EXPIRES12-31-25
RCDD

DRAWN BY: QDJ

PROJECT NUMBER: 220014.00

PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT N3 - LOWER LEVEL TECHNOLOGY PLAN

T1.03

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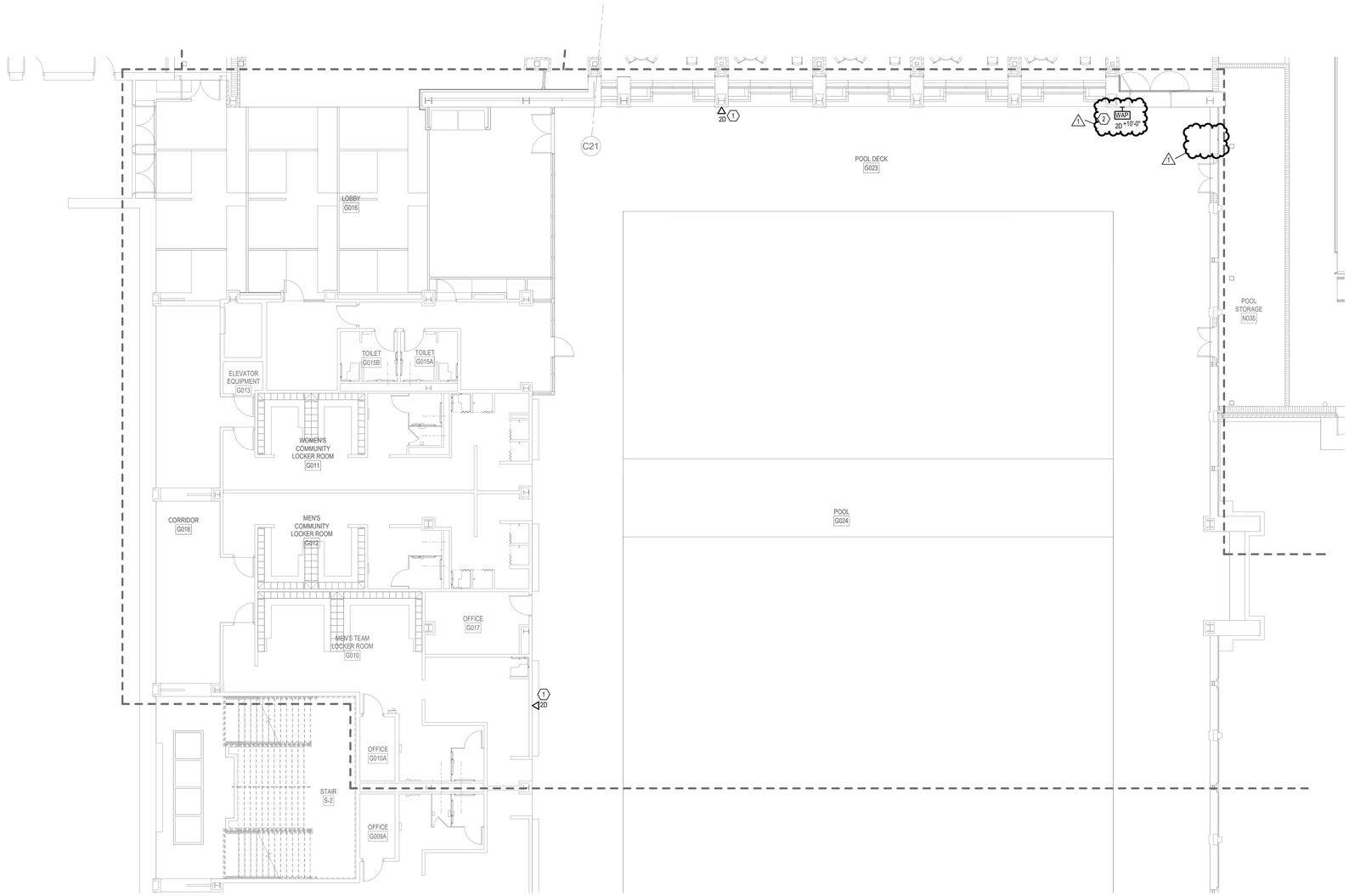
SHEET KEYNOTES

1 2 INSTALL CABINET IN EXISTING BUILT-IN
PROVIDE SINGLE CHANNEL SURFACE MOUNTED RACEWAY TO WIRELESS ACCESS POINT LOCATION. COORDINATE COLOR WITH ARCHITECT PRIOR TO INSTALLATION.



1 UNIT G1 - LOWER LEVEL TECHNOLOGY PLAN
1/8" = 1'-0"

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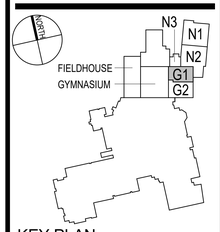

KEY PLAN

CONSTRUCTION DOCUMENTS

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Matt L Minnich
BICSI ID #162967
EXPIRES 12-01-25
RCDD

DRAWN BY: QDJ
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G1 - LOWER LEVEL TECHNOLOGY PLAN

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SHEET KEYNOTES

1. INSTALL CABLING IN EXISTING RACEWAY.
2. PROVIDE SINGLE CHANNEL SURFACE MOUNTED RACEWAY TO WIRELESS ACCESS POINT LOCATION. COORDINATE COLOR WITH ARCHITECT PRIOR TO INSTALLATION.



1 UNIT G2 - LOWER LEVEL TECHNOLOGY PLAN
1/8" = 1'-0"

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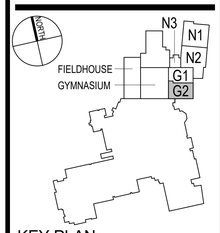

KEY PLAN

CONSTRUCTION DOCUMENTS

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Matt L Minnich
BICSI ID #162967
EXPIRES12-31-25
RCDD

DRAWN BY: QDJ
PROJECT NUMBER: 220014.00
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REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

UNIT G2 - LOWER LEVEL TECHNOLOGY PLAN

T1.05

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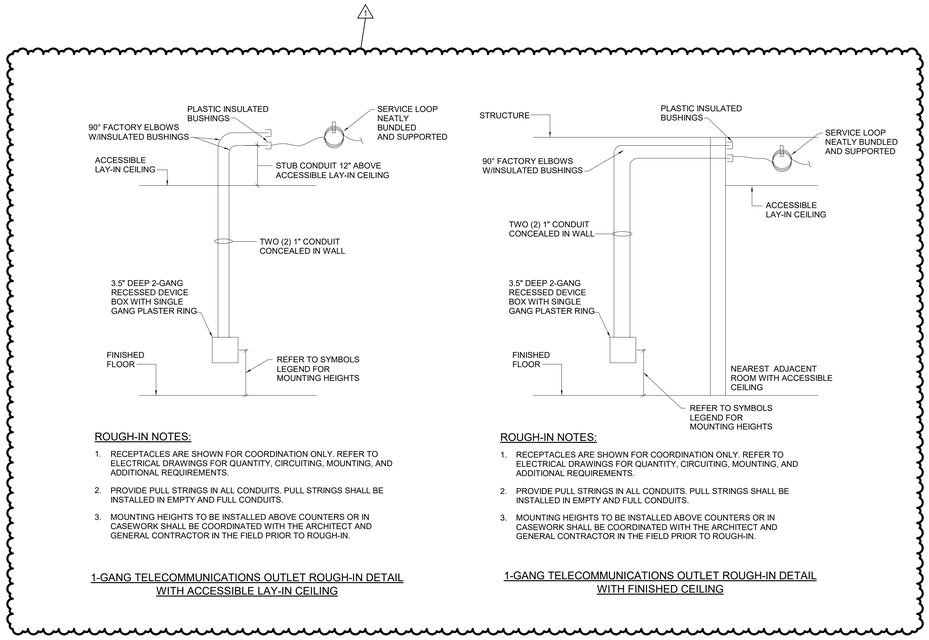
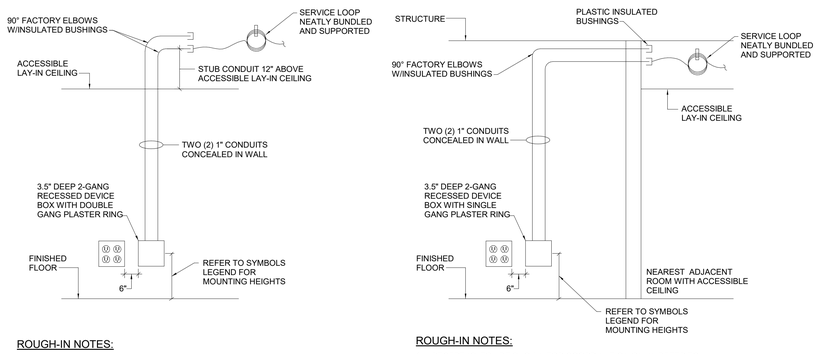


1 NEW WALL CONSTRUCTION 1-GANG ROUGH-IN DETAILS
NOT TO SCALE



2 NEW WALL CONSTRUCTION 2-GANG ROUGH-IN DETAILS
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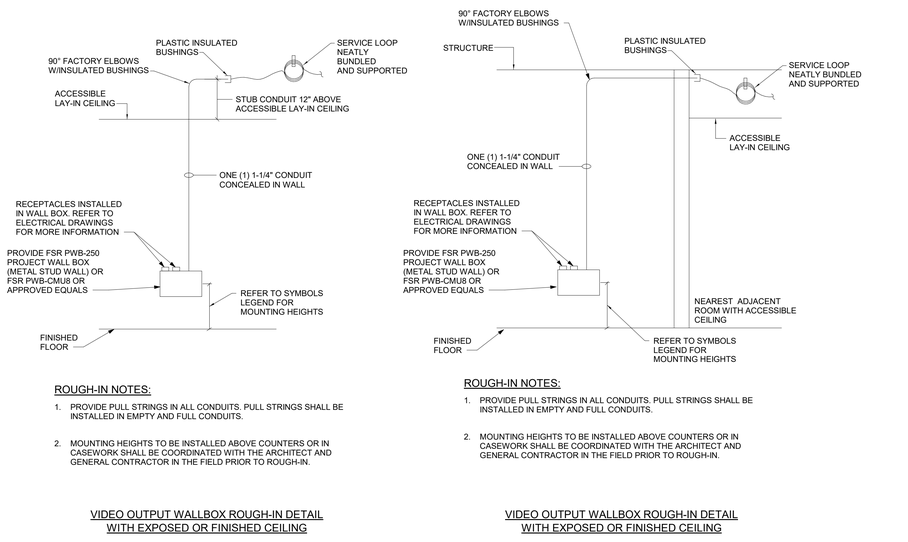
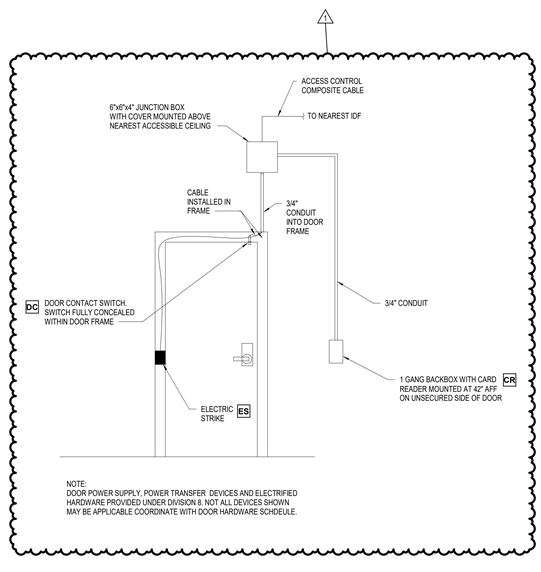
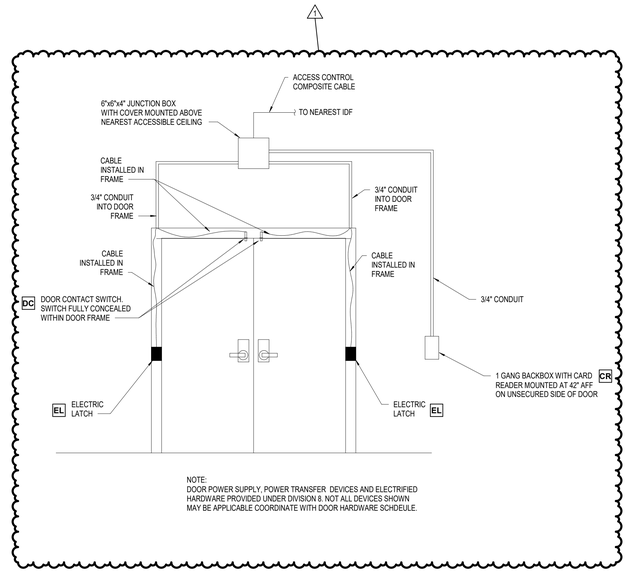


3 NEW WALL CONSTRUCTION VIDEO OUTLET ROUGH-IN DETAILS
1/8" = 1'-0"



4 TYPICAL SECURED SINGLE DOOR RISER
NOT TO SCALE



5 TYPICAL SECURED DOUBLE DOOR RISER
NOT TO SCALE

CARMEL HIGH SCHOOL NATATORIUM ADDITION AND RENOVATIONS

520 E MAIN STREET
CARMEL, IN 46032

CARMEL CLAY SCHOOLS

ARCHITECT

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CONSTRUCTION DOCUMENTS

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
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BICSI ID #162967
EXPIRES12-01-25
RCDD

DRAWN BY: Author
PROJECT NUMBER: 220014.00
PROJECT ISSUE DATE: 12.17.2021

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #1	01.25.2022

TECHNOLOGY DETAILS

T5.01

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