FFKR ARCHITECTS

ADDENDUM #1

Project:	U of U Bldg 303 Seismic Upgrade Phase 4 - #22508	**Addendum Number:**	#1
FFKR #:	18136 – Phase 4	**Date:**	5.17.2022
Contractor:	Gramoll Construction	**Attention:**	William Kreider

The Addendum is for all persons preparing Bids for the above named project; and, as such, shall be made a part of the Documents. Changes, corrections, and deletions enumerated herein shall be included in the Contractor's Bid. Bidders should acknowledge receipt of the Addendum in the space provided in the Contractor's Bid Form. Failure to do so may subject the Bidder to disqualification. In case of any conflict between the drawings, specifications, and this addendum, this addendum shall govern.

Make Changes to Bid documents as follows:

Bidders' questions:

1. Existing masonry to be removed above 11' or 11'-8" see A5/AE310 , various other locations stating 11'-8"
   Response: Re. keynote 02.06 Existing masonry wall to remain to 11'-8" A.F.F.

2. On A2/AD201 the hatch appears to have moved.
   Response: Corrected, refer to updated AD-201-4.

3. Phase 2 EMU 6,7,8 (2/S-201-2) on the west wall need to be installed in this phase.
   Response: Yes, these do need to be installed in this phase. See Addendum #1

4. Phase 2 cross bracing needs to be installed in this phasing
   Response: Yes. this needs to be installed in this phasing. See Addendum #1.

5. There is piping that will need to be relocated (while the boilers are used less) in order to get the beam at (3/B-C) installed
   Response: Beam at 3/B-C needs to be installed in this phase of work. See Addendum #1. Relocation of pipe to be responded by other

6. The tie back that have been installed to hold the existing masonry to the steel at all locations must be removed, correct?
   Response: Tie backs can be removed when the existing masonry is removed.

7. Civil plan calls for a fuel tank to ne demo'd. (Now I can't find the note) if needed please define.
   Response: That note cannot be found, please clarify.

8. C001 Utility note #12, who should we coordinate with?
   Response: This was a typo, refer to updated C001

9. C101 note 8 say demo by other can this be changed to refer to architectural pages?
   Response: Yes, refer to updated C101 and architectural demo sheets.

10. C201 note 13 talks about the scale house.
    Response: The scale house is no longer a part of the project.

11. C201 and C401, what is the hard surface at the gas yard.
    Response: Concrete, elevation to match existing.

12. AD-101-4 do the windows contain asbestos? Who removes them if they do?
    Response: The owner will take care of any asbestos abatement.

13. Define the stairs from L2 to the roof. Structure, D5/AE410, A/5-301-4, S102-4.
    Response: Refer to Addendum #1, alternate #2 – Penthouse dwgs.

14. If they are available can you provide the elevations for utilities that go under footings? Sewer and 1", 2" PVC at the north end of the addition?
    Response: We do not know the SS elevation at where we are proposing to tie-in. However, we do know that the SS manhole that the existing line leads to at the south has an invert elevation of 4727.27, which is 16.9 feet below existing grade in that area. We can research this further if necessary.

15. 3/S-202-4 what is the size of the HSS
    Response: See A/S-301-4 for required size (HSS 8x6x3/8)

16. 3.08 on AE-311 please confirm what this note means?
    Response: 3.08 – ½" concrete edge chamfer

17. Please provide reference notes for AE600-4
    Response: Provided, refer to updated AE600-4.

Provide pricing for these additional items:

18. Bid Alternate #2 – Penthouse and stairs construction.
19. Also refer to any additional architectural, structural, and mechanical works that were not completed in the previous phase due to existing condition/conflicts.
20. Revisions made in response to plan checker's comments were also included.
21. Existing scale house conversion, remove the existing analog scale read out and run a electrical conduit from the scale pit to the office building. Coordinate with the scale conversion sub.

Additional information:

22. Subcontract agreement

NO. XXXXX

SUBCONTRACT AGREEMENT

THIS SUBCONTRACT AGREEMENT ("Subcontract") by and between GRAMOLL CONSTRUCTION COMPANY, a Utah corporation, hereinafter referred to as "Contractor," and **(SUBCONTRACTOR NAME AND ADDRESS) hereinafter referred to as "Subcontractor,"** is entered into and shall be effective as of the date it has been signed by both parties hereto (the "Subcontract Date"). If Subcontractor commences work prior to signing this Subcontract, the Subcontract Date shall be deemed to be the date Subcontractor commenced the Work.

RECITALS

1. Contractor has entered into a contract with **[PROJECT OWNER]** for the construction, performance and completion of a certain project known as **[PROJECT TITLE]** said contract being hereinafter referred to as the "General Contract".

2. Subcontractor desires to furnish, and Contractor desires to have Subcontractor furnish a portion of the work for Contractor. Contractor and Subcontractor desire to establish the terms and conditions that govern the relationship between them when Subcontractor furnishes such labor, materials, and equipment pursuant to this Subcontract.

ARTICLE I

1.1 **Scope of Work.** Subcontractor shall furnish all labor, materials, permits, tools, machinery, equipment, facilities, supplies and services, pay all applicable taxes, and comply with any and all additional requirements imposed by the jurisdiction in which the work is performed, and to do all things necessary to complete the following items of work under the General Contract (the "Work"):

Furnish all labor, materials, equipment and supervision required to complete all [LABOR TYPE] work required, as described in specifications sections [SECTION NUMBER AND DESCRIPTION] and as shown on the drawings in [BID PACKAGE] and comply with all other sections of the specifications and the drawings dated [DATE], for [PROJECT NAME] prepared by [ARCHITECT], as related to such work.

Addenda:

Alternates:

Includes:

Excludes: SALES TAX

Hereinafter, all such documents, plus this Subcontract and the General Contract are collectively referred to as the "Subcontract Documents." All Subcontract Documents other than this Subcontract are incorporated herein by reference and hereby adopted and made a part of this Subcontract as fully as if it were set forth in full herein, subject to the limitations set forth in Article I hereof. All General, Supplemental General, and Special Conditions of the specifications and all terms and conditions of the General Contract shall apply to this Subcontract, except where ambiguous or inconsistent with this Subcontract, in which case the provisions of this Subcontract shall control. Subcontractor acknowledges that the Work to be performed by Subcontractor is not confined to any particular portion of the drawings or section of the specifications but may be scattered throughout those documents. In the performance of this Subcontract, Subcontractor binds itself to Contractor to comply fully with all undertakings and obligations of the Contractor to the extent that they apply to the scope of the Work.

ARTICLE II

2.1 **Subcontract Price.** Contractor shall pay Subcontractor for completion of the Work in accordance with the Subcontract Documents the lump sum of **[Subcontract Price]** (the "Subcontract Price.") The Subcontract Price includes all costs and expenses to perform the Work, and associated with the performance of the Work, including, without limitation, (1) all applicable transportation charges, costs and expenses, and (2) all applicable taxes including, without limitation, applicable taxes under any law now existing, or which may hereafter be

adopted by federal, state, local or other governmental authorities, taxing the labor, materials, or equipment furnished, or any other tax levied as a result of performance of the Work. The Subcontract Price may be adjusted only as provided for in Article V.

ARTICLE III

3.1 **Independent Contractor.** The relationship of Subcontractor to Contractor during the term of this Subcontract shall be that of an independent contractor. Subcontractor shall take any and all actions necessary to maintain that independent contractor relationship throughout the term of the Subcontract, and neither Subcontractor nor its employees shall be considered employees of Contractor. Subcontractor shall exercise exclusive control for the means, methods, techniques, and procedures in performance of the Work.

3.2 **Examination of Subcontract Documents/ Site.** Subcontractor has examined the Subcontract Documents and the applicable Laws and Regulations, as that term is defined below, and has examined the site of the work and satisfied itself as to all conditions to be encountered in the performance of the Work. Subcontractor enters this Subcontract on the basis of its own examination, investigation and evaluation of all such matters, and not in reliance on the opinions or representations of Contractor or Owner. If there are any inconsistencies between the Subcontract Documents or ambiguities in any Subcontract Document, Subcontractor shall bring such inconsistencies or ambiguities to the attention of Contractor before the execution of this Subcontract; otherwise, Subcontractor shall be bound by Contractor's resolution of such inconsistencies or ambiguities.

In the event of any discrepancy (1) in the Subcontract Documents, or (2) between the Subcontract Documents and the Laws and Regulations, those which are more stringent, provide persons and property with greater protection, or provide for a better product shall govern. In the event of any discrepancy in the Subcontract Documents between dimensions and measurements for the Work based on scaling, the Work shall comply with the dimensions for such Work. Subcontractor shall promptly notify Contractor in writing of any such discrepancy. To the extent that the Subcontract Documents include plans, specifications or other documents that depict, refer or relate to mechanical, plumbing, electrical or fire protection systems, such documents are diagrammatic only, and are not intended to show the precise alignment, physical locations, or configurations of such Work. The Subcontract Price includes all costs and expenses for such systems to be installed such that they clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance.

Before commencing Work, Subcontractor will satisfy itself as to the location of all utilities that may affect or interfere with Subcontractor's Work. Subcontractor will fully protect all utilities, and keep them operating at all times, unless otherwise provided in the Subcontract Documents. Subcontractor shall take such field measurements as are necessary for the proper execution of its work. It shall be assumed that the Subcontractor has fully accepted the work of others as being satisfactory and he shall be fully responsible thereafter for the satisfactory performance of the work covered by this Agreement, regardless of the defective work of others.

3.3 **Lines, Levels, Dimensions and Measurements.** Subcontractor assumes full responsibility for the proper interpretation and interpolation of all lines, levels, dimensions, and measurements and their relation to benchmarks, property lines, reference lines and the work of Contractor and other trades. In all cases where dimensions are governed by conditions already established, the responsibility for correct knowledge of the condition's rests entirely on Subcontractor. The Work shall comply with the dimensions provided in the Subcontract Documents and shall not be performed based on scales indicated in those documents. No variations from specified lines, levels or dimensions shall be made except on prior written approval of Contractor clearly setting forth the variation.

3.4 **Shop Drawings/ Submittals.** Shop drawings and submittals shall be provided in a minimum of one (1) digital copy to Contractor's office in North Salt Lake. Additional copies shall be provided if required by the Subcontract Documents. Shop drawings and/ or submittals and/ or samples are due within fourteen (14) days of Subcontract's date of issuance. At the time of submission, Subcontractor shall clearly identify in writing any deviation in its shop drawings/ submittals/ samples from the requirements of the Subcontract Documents and must receive from Contractor specific written approval for any deviation.

3.5 **Warranty.** Subcontractor warrants that:

3.5.1 all materials and equipment furnished under this Subcontract will be of good quality and new, unless otherwise required or permitted by the Subcontract Documents.

3.5.2 the materials and equipment provided as part of the Work will be suitable for the purposes intended in the Subcontract Documents.

3.5.3 the Work will be performed in a good and workmanlike manner.

3.5.4 the Work will conform to the requirements of the Subcontract Documents; and

3.5.5 the Work will be free from defects.

Work not conforming to these requirements including, without limitation, substitutions not properly approved and authorized, shall be considered defective (all such work, "Defective Work"). Subcontractor shall (1) execute any special guarantees, and (2) assign to Contractor all warranties, as required by the Subcontract Documents.

3.6 **Correction and Replacement of Defective Work.** During performance of the Work, Subcontractor shall promptly correct or replace Defective Work. Contractor shall determine whether Work is defective and whether work performed by Subcontractor to correct or replace Defective Work complies with Subcontractor's warranty obligations.

3.6.1 If, within the greater of (1) the period established in the Subcontract Documents, or (2) one year after the Completion Date, (hereinafter the "Warranty Period"), any of Subcontractor's Work is found to be defective, Subcontractor shall correct or replace it promptly after receipt of written notice of the Defective Work. If Contractor prefers to accept, rather than correct or repair Defective Work, Contractor may, in its sole discretion, accept the work subject to its right of reimbursement, as set forth below.

3.6.2 Subcontractor shall pay all costs to correct or replace Defective Work without any adjustment to the Subcontract Price or Subcontract Time. If Subcontractor fails to correct Defective Work within the time allowed by Contractor, or if no time is specified, a reasonable time after receipt of notice of such defects, Contractor may correct or replace the Defective Work. Subcontractor shall reimburse Contractor for (1) the costs to correct or replace defective Work, including, without limitation, the costs of additional sampling, testing and inspections, if any, made necessary by Defective Work, corrections or replacements, (2) all Losses that Contractor incurs that arise out of or result from Defective Work, (3) any amounts assessed and collected by Owner from Contractor for acceptance of Defective Work, and (4) any other amounts for which Subcontractor is responsible at law or in equity.

3.7 **Safety.** Subcontractor shall initiate, maintain and supervise all safety precautions and programs in connection with the Work including, without limitation, such precautions and programs as necessary to comply with the Gramoll Project Safety Rules and Regulations that are expressly made a part of the Subcontract Documents. Subcontractor shall take all necessary precautions to prevent damage, injury or loss to (a) all persons performing the Work or who may be affected by the Work; and (b) all Work, whether stored on or off the Project site. Subcontractor shall promptly report to Contractor all accidents incidental to the Work which result in death or injury to persons or in damage to property. Subcontractor shall provide to Contractor any reasonable documentation requested by Contractor related to any such death, injury, damages.

3.8 **Compliance with Laws and Regulations.** Subcontractor shall comply with and give all notices required by all federal, state, local, and municipal laws, regulations, codes, ordinances, and orders that directly or indirectly bear on the Work and/or the performance of the Work including, without limitation:

3.8.1 building codes and ordinances.

3.8.2 worker's compensation laws and regulations.

3.8.3 safety laws, codes, regulations and orders, including, without limitation, the Occupational Safety & Health Act of 1970, as enacted and amended, and regulations issued under that act.

3.8.4 environmental laws including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act, the Clean Water Act, the Clean Air Act, and the Resources Conservation and Recovery Act, as enacted and amended, regulations issued under those acts, and counterpart state laws;

3.8.5 wage, hour, labor, and anti-discrimination laws, including, without limitation, the Equal Employment Opportunity (EEO) Executive Order 11246, Title VII of the Civil Rights Act of 1964, the Age Discrimination in Employment Act of 1967, the Equal Pay Act of 1963, the Family and Medical Leave Act, the Americans with Disabilities Act, the National Labor Relations Act, the Fair Labor Standards Act; Sections 503 and 504 of the Rehabilitation Act of 1973, Section 402 of the Vietnam Era Veterans Readjustment Assistance Act of 1974, the Immigration Reform Control Act of 1986, as enacted and amended, and all regulations issued under those acts; and

3.8.6 tax laws and regulations; all as enacted and amended, and all regulations issued under such acts

Collectively, these are referred to in this Subcontract as the "Laws and Regulations."

3.9 **Subcontractors.** Subcontractor shall not assign this contract, in part or in whole, without Contractor's prior written consent, nor shall Subcontractor assign any monies due or to become due to it hereunder, without Contractor's prior written consent. Subcontractor shall, upon request from Contractor at the inception of this Subcontract, provide to Contractor or supplier a written list of sub-subcontractors or suppliers that Subcontractor intends to use in connection with the performance of its obligations under this Subcontract where the dollar amount individually or in the aggregate with the same sub-subcontractor will exceed 5% of the Subcontract Price. Subcontractor shall require all of its sub-subcontractors to comply with the Subcontract Documents to the extent that they apply to the scope of work of such sub-subcontractor. Subcontractor shall not change sub-subcontractors without prior written approval of Contractor.

Upon Contractor's request, Subcontractor agrees to provide documentation evidencing full payment of all sub-subcontractors and/or suppliers engaged by Subcontractor with respect to its performance of this Subcontract.

If this Subcontract is terminated, each of Subcontractor's contracts for performance of the Work shall be assigned to Contractor, provided that Contractor accepts such assignment in writing and assumes all rights and obligations of Subcontractor pursuant to each such contract.

3.10 **Cleanup.** Subcontractor will continuously clean, and remove from the jobsite, its debris and excess materials and at the end of each day will leave its working areas in broom-clean condition. Also, he shall clean up to the satisfaction of the inspectors, all dirt, grease marks, etc., from walls, ceilings, floors, fixtures, etc., deposited or placed thereon as a result of the execution of this Subcontract. If Subcontractor fails to do so, Contractor may perform the cleanup and backcharge Subcontractor for the cost of performing such clean-up.

3.11 **Supervision.** Subcontractor shall have available on the project, at all times, a qualified superintendent, who is acceptable to Contractor, to coordinate the Subcontractor's work with that of the Contractor and of the other subcontractors, and any instruction given by the Contractor to said representative on the project shall have the same force and effect as if given to the Subcontractor either at the project or at the Subcontractor's office away from the project site.

ARTICLE IV

4.1 **Subcontract Time.** Subcontractor shall commence and complete the Work in accordance with the most current schedule prepared by Contractor, as may be revised from time to time during the course of the Project (the "Project Schedule"). Subcontractor shall commence and complete all activities in compliance with the time periods expressly provided for such activities in the Project Schedule. The periods of time provided in the Project Schedule for commencement and final completion of all activities that comprise the Work shall constitute the "Subcontract Time." Except as otherwise expressly noted, as used herein and in the Project Schedule, the term "day" shall refer to a calendar day. The date on which all the work performed by Contractor and its subcontractors is completed and accepted by the Owner shall be referred to hereinafter as the "Completion Date."

Subcontractor's commencement, prosecution, and completion of the Work in the Subcontract Time and in compliance with the Project Schedule is of the essence of this Subcontract.

Subcontractor acknowledges that the precise time periods scheduled for its performance are estimates only. Subcontractor shall cooperate with Contractor in scheduling and performing its work to avoid conflict or interference with the work of Contractor or other trades. Contractor reserves the right, in its sole discretion, to extend or to delay the scheduling of Subcontractor's work if such extension or delay becomes necessary in the opinion of Contractor. Each Subcontractor shall review the schedule of all items of work other than his own, to anticipate completion of specific items of its Work as it affects other trades, to be certain that work following Subcontractor's Work is not delayed. In the event of any conflicts in the Project Schedule between the work of Subcontractor and Contractor or another trade, Contractor shall determine, in its sole discretion, which work shall have precedence and how the parties will coordinate their respective work. All other work not specifically scheduled shall be coordinated as necessary to avoid delaying Work as scheduled. Subcontractor shall not be entitled to an adjustment in the Subcontract Price or the Subcontract Time based on the coordination of such activities with Contractor or any determination by Contractor concerning coordination of the work.

If Contractor determines, in its sole discretion, that Subcontractor has failed to diligently prosecute the Work in accordance with the Project Schedule, or that Subcontractor will not complete the Work within the Subcontract Time, Contractor may, in its sole discretion, (1) require Subcontractor to work overtime and/or use such additional labor and equipment as necessary to accelerate the Work and bring Subcontractor's performance into compliance with the Project Schedule, (2) supplement Subcontractor's work by furnishing additional labor and equipment to the Project as necessary to accelerate the Work and bring Subcontractor's performance into compliance with the Project Schedule, (3) require Subcontractor to provide reasonable assurances of timely performance in accordance with the Project Schedule, (4) terminate this Subcontract pursuant to Article X, and/ or (5) exercise all other rights and remedies available under this Subcontract. Subcontractor shall not be entitled to an adjustment in the Subcontract Price or the Subcontract Time as a result of any such action by Contractor.

ARTICLE V

5.1 **Changes and Modifications to Subcontract.** Without invalidating the Subcontract and without notice to any surety, Contractor may, at any time or from time to time, order additions, deletions or revisions in the Work or acceleration of the Work. Any such additions, deletions, revisions, or acceleration shall be binding upon Contractor and Subcontractor exclusively when made in writing executed by James Gramoll. Upon receipt of such an order, Subcontractor shall promptly proceed with the Work involved, which shall be performed under the applicable conditions of this Subcontract and the Subcontract Documents, except as otherwise specifically provided. Subcontractor shall not proceed to perform changes in the Work without prior written authorization from Contractor as provided herein. Subcontractor shall not be entitled to an adjustment in the Subcontract Price or the Subcontract Time for any work performed without such prior written authorization. Except as provided in this Article V or Section 12.1, the terms and conditions of this Subcontract are not otherwise subject to addition, modification, or change.

5.2 **Claims.** The Subcontract Price and the Subcontract Time may be changed only by a written directive by Contractor, change order, or written Amendment to this Subcontract signed by James Gramoll. Within seven (7) working days of an occurrence or event giving rise to a claim for a adjustment in the Subcontract Price or Subcontract Time, Subcontractor shall provide to Contractor written notice (hereinafter, a "Claim") stating the nature of the Claim and the adjustment in Subcontract Price and Subcontract Time requested, accompanied by supporting documentation. All Claims shall include and/ or be accompanied by the following supporting information and/ or documents: (a) the specific amount of the requested adjustment in the Subcontract Price, if any, (b) the specific number of days' adjustment in the Subcontract Time requested, if any, (c) the reasons justifying the request for an adjustment in the Subcontract Price and the Subcontract Time, including a CPM analysis demonstrating a critical path delay for any requested adjustment in the Subcontract Time, if any, (d) the party or parties whose orders, decisions, acts or omissions give rise to the requested adjustment in the Subcontract Price and/ or the Subcontract Time, and (e) a revised schedule based on the requested adjustments in the Subcontract Time, if any.

A Claim shall be deemed to include all adjustments in Subcontract Price and/ or Subcontract Time to which the claimant is entitled as a result of the occurrence or events giving rise to the Claim. No Claim by Subcontractor for an adjustment of the Subcontract Price or Subcontract Time will be valid if not delivered to the Contractor within the seven (7) working day period prescribed above. Subject to Contractor's right to terminate Subcontractor's rights under this Subcontract, Subcontractor shall continue performance of its

obligations under this Subcontract notwithstanding any dispute between Contractor and Subcontractor concerning a Claim asserted by either party.

Subcontractor's sole and exclusive right to an adjustment in the Subcontract Price and/ or the Subcontract Time shall be the adjustment in the contract price and/ or the contract time to the General Contract actually received by Contractor from Owner on behalf of Subcontractor as a result of any such Claim. Subcontractor shall not be entitled to any adjustment in the Subcontract Price or the Subcontract Time or any other remedy under this Subcontract or remedy for breach thereof as a result of any event, occurrence, or act or omission of Contractor or Owner beyond such adjustment in the contract price and/or the contract time to the General Contract received by Contractor from Owner. Receipt by Contractor of a fully-executed written change order from Owner is a condition precedent to Subcontractor's right, if any, to an adjustment in the Subcontract Price and/ or the Subcontract Time, a remedy under this Subcontract, or remedy for breach of this Subcontract. Subcontractor's right to recover for such change, remedy, or breach shall be limited to the adjustment in contract price and/ or contract time received by Contractor from Owner for such change, remedy, or breach.

5.3 **Delays** If events, occurrences, acts, or omissions beyond the control of Subcontractor including, without limitation, the work of other trades or contractors, fire, earthquake, acts of God, terrorist acts, riots, war, strikes or other force majeure events delay Subcontractor's Work, the Subcontract Time and/ or the Subcontract Price will be adjusted to the extent of any adjustment in the contract price and/ or the contract time in the General Contract received by Contractor from Owner on behalf of Subcontractor. Subcontractor may make a Claim for an adjustment in the Subcontract Time and/ or the Subcontract Price if, and only if, Subcontractor timely presents to Contractor a Claim in compliance with Section 5.2. Any such adjustment in the contract price and/ or the contract time under the General Contract received by Contractor from Owner shall be Subcontractor's sole and exclusive remedy for such delays, if any, to Subcontractor's Work on the Project. Receipt by Contractor of a fully executed written change order from Owner is a condition precedent to Subcontractor's right, if any, to an adjustment in the Subcontract Price and/ or the Subcontract Time for delays of any kind or nature.

The Subcontract Time and the Subcontract Price shall not be adjusted and Subcontractor shall not be entitled to any remedy under this Subcontract, or for breach of this Subcontract for (a) delays caused concurrently by Subcontractor and Contractor, Owner or any other person, or (b) any other delays to Subcontractor's Work on the Project for any other events, occurrences, acts or omissions of any person or entity or of any other kind or nature other than that for which an adjustment in the Subcontract Price and/ or the Subcontract Time are expressly authorized in this Section.

5.4 **Subcontractor-Caused Delays.** Subcontractor recognizes and acknowledges that Contractor will suffer substantial Losses if Subcontractor fails to perform the Work in compliance with the Project Schedule. Subcontractor shall indemnify and hold Contractor harmless from and against any and all Losses and liquidated damages that are attributable to or caused by Subcontractor's failure to perform the Work in compliance with the Project Schedule. In addition to liquidated damages, such Losses may include, without limitation, direct jobsite overhead costs such as costs for project management and supervision, quality control, utilities, and other costs such as home office overhead, attorneys' and other professional fees, and other usual and customary mark-ups. If Contractor incurs Losses and/ or is assessed liquidated damages as a result of delays caused concurrently by Subcontractor and other trades or contractors, such Losses and/ or liquidated damages shall be pro rated by Contractor, in its sole discretion, between Subcontractor and all other responsible parties. Contractor's allowing Subcontractor to proceed with Work beyond the time specified for Subcontractor's performance of that Work shall not constitute a waiver of any rights by Contractor to recover damages for Subcontractor's delay.

ARTICLE VI

6.1 **Payment.** Contractor shall pay Subcontractor in monthly payments of 95% percent of the work performed in any preceding month, in accordance with estimates prepared by Subcontractor. **All such pay estimates shall be made on the sample form provided, entitled "Subcontractor's Application for Payment."** Contractor has the unfettered right, at its discretion, to adjust Subcontractor's statements to reflect any overestimation of the percent of work complete made by Subcontractor in a pay estimate.

6.2 **Pay-If-Paid.** When such pay estimates are approved by Contractor and/ or the Owner, Contractor will pay Subcontractor as payments are received by Contractor from the Owner covering the monthly pay estimates of the Contractor, including the approved portion of Subcontractor's monthly pay estimate.

All payments to Subcontractor will be made only from a special fund, namely, from payments made by Owner to Contractor in respect of work performed by Subcontractor. No payments will be made to Subcontractor unless that fund comes into existence. Owner's payment to Contractor for Subcontractor's Work is an express condition precedent to Contractor's obligation to make any payment to Subcontractor.

6.3 **Delayed Pay Estimate/ Retainage.** If the Subcontractor fails to submit a timely request for payment in an amount approved by Contractor, Subcontractor's payment may be delayed. Contractor shall have the right to withhold from any payment the percentage of retention set forth in the General Contract between Contractor and the Owner, but in no case less than five percent of all amounts due Subcontractor until the project is fully completed and accepted by the architect or Owner, and Contractor has received final payment from the Owner.

6.4 **Payroll Summaries/ Prevailing Wages.** Subcontractor agrees to furnish to Contractor one copy of each weekly payroll summary within seven days after the date of payment. Subcontractor agrees to comply with any and all provisions in the General Contract relating to labor standards, minimum wages and other wage and hour provisions to the same extent as they are binding upon Contractor. In the event the Owner requires Contractor to furnish payroll affidavits, subcontractor agrees to furnish similar affidavits to the Contractor.

6.5 **Withholding.** Contractor may withhold payment to Subcontractor in whole or in part to the extent necessary, in Contractor's sole discretion, to protect Contractor against Losses for which Subcontractor is responsible as a result of any Default, as that term is defined below.

If, at any time prior to final payment, Contractor determines, in its sole discretion, that it is insecure regarding Subcontractor's ability, willingness, or intent to fulfill its warranty obligations under the Subcontract Documents, Contractor may, at its option, withhold final payment during the entire Warranty Period. Subcontractor waives any right to recover interest on the amount withheld during that time. Contractor shall make final payment for Subcontractor's Work within ten (10) days of (1) expiration of the Warranty Period, or (2) Contractor's receipt of adequate assurances from Subcontractor of its ability, willingness and intent to perform the warranty work, subject to receipt of by Contractor of final payment from Owner as provided in Section 6.2.

6.6 **Backcharges.** Where feasible, Contractor shall use reasonable efforts to give Subcontractor notice before any costs are incurred which will be offset against the Subcontract Price. If Subcontractor disagrees with the nature or amount of costs to be incurred, it shall advise Contractor promptly in writing, and in no event later than three (3) days after its receipt of notice from Contractor. Such notification shall include reasons for Subcontractor's dispute and shall propose a reasonable and acceptable alternative along with an estimate of the cost of the alternative, where applicable.

If Contractor receives no protest to a proposed backcharge or Subcontractor protests and does not provide an alternative to Contractor's proposed action, Contractor may proceed to incur the costs and offset them against the Subcontract Price. Costs so offset shall be deemed to be reasonable and beyond dispute by Subcontractor. If Subcontractor timely protests and proposes a reasonable alternative that Contractor rejects, the disputed costs incurred shall be subject to the dispute resolution procedure outlined in Article XI, if Subcontractor gives Contractor written notice within ten (10) days of such rejection.

6.7 **Lien Waivers.** Subcontractor shall present to Contractor lien waivers for all labor, materials and equipment furnished by others in connection with this Subcontract prior to receiving each payment hereunder. Contractor may require such lien waivers as a condition of progress or final payment.

6.8 **Liens.** Subcontractor shall timely pay all claims for labor, materials, and equipment incurred in the performance of the Work and shall (1) keep the property on which the Project is situated (the "Property") free from mechanic's liens or attachments, and (2) prevent the filing of any claim or stop notice against funds or the payment of funds owed to Contractor, by any person or entity performing a portion of the Work. If any mechanic's lien, attachment, claim against funds, or stop notice is filed against the Property or funds owed to Contractor arising out of or related to performance of the Work, Subcontractor shall, within ten (10) days after written demand by Contractor, take all reasonable steps necessary to cause the effect of such lien, attachment, claim, or stop notice to be released. Upon request by Contractor, Subcontractor shall obtain a lien release or discharge bond or other bond satisfactory to Contractor in the amount of 150% all liens, attachments, claims, or stop notices so recorded or served.

6.9 Acceptance of, or payment for, Subcontractor's defective or late work shall not constitute a waiver of any claim or offset that Contractor may have under the terms of this Subcontract.

ARTICLE VII

7.1 **Indemnification.** To the fullest extent allowed by law, Subcontractor shall indemnify and hold harmless Contractor, Owner, the project architects and engineers, and all of their respective agents and employees (the "Indemnitees") from and against all claims, damages, losses and expenses including, without limitation, attorney's fees ("Losses"), arising out of or resulting from (1) any Default, or failure by Subcontractor to comply with any express duty, warranty, representation, acknowledgment or covenant in this Subcontract, (2) any charges, claims, or liquidated damages assessed and collected by the Owner against Contractor as a result of and to the extent caused by any act or omission of Subcontractor or its sub-subcontractors, guests or invitees; (3) personal or bodily injury to or death of any person, including, without limitation, any agent, employee, guest or invitee of Subcontractor or its sub-subcontractors, other contractors, Contractor, or Owner, to the extent caused by any act or omission of Subcontractor or its sub-subcontractors, guests or invitees, (4) damage to or loss of property to the extent caused by any act or omission of Subcontractor or its sub-subcontractors, guests or invitees, (5) any use of Contractor's equipment, tools, rigging, blocking, hoists, or scaffolding, (6) liens, attachments, claims, or stop notices against funds or payments owed to Contractor, recorded or served by any of Subcontractor's sub-subcontractors, or (7) infringement of any patent or copyright by Subcontractor. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this paragraph.

The indemnity agreement shall be covered by Subcontractor's comprehensive general liability insurance policy. The indemnity obligations set forth in this Subcontract shall not be limited by (1) the Subcontract Price, or (2) the amount or type of proceeds, compensation, or benefits available to Subcontractor under any insurance policy including, without limitation, any self-insurance or similar program or policy maintained by Subcontractor.

At the request of an Indemnitee, Subcontractor shall defend any claim for Losses against an Indemnitee. The Indemnitee shall be entitled to approve the legal counsel to be paid for by Subcontractor for the purpose of defending such claims for Losses. No claim for Losses shall be settled or discontinued, nor shall judgment be permitted to be entered without the written consent of the Indemnitee, which consent shall not be unreasonably withheld.

ARTICLE VIII

8.1 **Insurance.** Unless otherwise specified in the Subcontract Documents indicating that insurance shall be provided pursuant to an owner-controlled or contractor-controlled insurance program, Subcontractor shall purchase and maintain the following insurance coverages for itself and the Additional Insureds during the course of the Work and during the Warranty Period, and shall maintain completed operations coverage for itself and the Additional Insureds for the length of time necessary to cover any manifestation date within the applicable statutes of limitations and/ or repose which pertain to the Work. If additional insurance coverage or greater limits of liability are required by the General Contract Documents, such provisions shall control.

8.1.1 **Commercial General Liability** coverage on an occurrence basis with a deductible not to exceed $1,000 per occurrence that includes coverage for liability assumed under any oral or written contract relating to the conduct of Subcontractors' business, including this Subcontract, and also including (1) broad form property damage liability coverage; (2) premises-operations coverage; (3) explosion and collapse hazard coverage; (4) underground hazard; (5) products and completed operations hazard coverage, and (6) independent contractor coverage. The limit of liability shall be not less than $1,000,000 each occurrence, $2,000,000 general aggregate (subject to a per project general aggregate provision applicable to the project per ISO form CG 2503 or its equivalent), $2,000,000 products/completed operations aggregate and $1,000,000 personal and advertising injury.

Claims Made/Self-Insurance Provisions. Subcontractor shall not provide general liability insurance under any Claims-Made General Liability form without express prior written consent of Contractor. Any self-insurance program providing coverage in excess of $25,000 per occurrence requires the prior written consent of the contractor.

8.1.2 **Automobile Liability** coverage in comprehensive form affording coverage for owned, hired, and non-owned vehicles. The limit of liability shall not be less than $1,000,000 for bodily injury and property damage combined, $1,000,000 for each accident. (No aggregate on automobile

insurance). The General Contractor, Owner and all other parties required of the General Contractor, shall be included as insureds on the auto policy.

8.1.3 **Workers Compensation and Employers Liability** coverage with Workers Compensation limits complying with statutory requirements, and Employers Liability Insurance limits of at least $1,000,000 each accident, $1,000,000 for bodily injury by accident, and $1,000,000 each employee for injury by disease. Workers' compensation insurance shall comply with the statutory form.

8.1.4 **Commercial Umbrella** coverage with limits of at least $1,000,000. Umbrella coverage must include as insureds all entities that are additional insureds on the CGL. Umbrella coverage for such additional insureds shall apply as primary before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insured other than the CGL, Auto Liability and Employers Liability coverages maintained by the Subcontractor.

8.1.5 **Hazardous Materials** If Subcontractor and/or its subcontractors or suppliers, regardless of tier, perform remediation of hazardous material, or if their operations create an exposure to hazardous materials as those terms are defined in federal, state, or local law, Subcontractor and its subcontractors and suppliers must obtain a "Contractor's Pollution Liability" policy with limits not less than $1,000,000 per occurrence and $2,000,000 aggregate for Bodily Injury, Personal Injury, and Property Damage, naming Contractor and Owner as additional insured. If Subcontractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), they must carry Auto Liability insurance with a $1,000,000 Combined Single Limit for Bodily Injury and Property Damage applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948.

8.1.6 **Professional Liability Coverage** Any subcontractor performing work that includes design/build work or services shall obtain a Professional Liability Insurance Policy. Design/build work includes, without limitation, design/build work with respect to mechanical, structural, plumbing, and fire sprinkler systems. Coverage must allow for a minimum of two years following the completion of the project. If Owner or Contractor elects to purchase a project design policy, Subcontractor's policy shall be endorsed to provide excess coverage only.

The liability insurance policies, including commercial general liability, automobile liability and excess liability, shall be endorsed to provide: (1) that Contractor and Owner are additional insureds (the "Additional Insureds") per ISO form CG 20 10 07 04 and CG 20 37 07 04 or their equivalent, (2) that the insurance afforded by the policies shall apply to Contractor as though a separate policy had been issued to Contractor, and (3) that the coverage afforded to Contractor is primary and any other insurance in force for Contractor will be excess and will not contribute to the primary policies. All required insurance shall be provided by insurance companies with a rating of A- VII or better by A.M. Best Company.

Prior to performing any Work, Subcontractor shall provide Contractor with a certificate of insurance demonstrating that Subcontractor has obtained all of the insurance coverages required by this Section. An additional insured endorsement shall be attached to such certificate of insurance. The certificate of insurance and the insurance policies effectuating coverages required by this Section shall contain a provision that coverage afforded under the policies will not be canceled or allowed to expire until at least 30 days prior written notice has been given to Contractor.

8.2 Subcontractor waives all rights against Contractor, Owner and Architect and their respective agents, officers, directors and employees for recovery of damages to the extent these damages are covered by commercial general liability, commercial umbrella liability, business auto liability or workers compensation or employers liability insurance.

8.3 Subcontractor will protect the job site, the work of Contractor and subcontractors, and its own work until completion and acceptance of the entire project. Contractor and Subcontractor waive all rights against each other and against all other subcontractors and Owner for loss or damage to the extent reimbursed by Builder's Risk or any other property or equipment insurance applicable to the work, except such rights as they may have to the proceeds of such insurance. If the Subcontractors policies of insurance referred to in this Section require an endorsement or consent of the insurance company to provide for continued coverage where there is a waiver of subrogation, the owners of such policies will cause them to be so endorsed or obtain such consent.

Upon written request of the Subcontractor, Contractor shall provide Subcontractor with a copy of the Builder's Risk policy of insurance or any other property or equipment coverage in force for the project and procured by Contractor. Subcontractor shall satisfy himself as to the existence and extent of such coverage prior to commencement of Subcontractor's work.

If Builder's Risk insurance purchased by Owner or Contractor provides coverage for Subcontractor for loss or damage to Subcontractor's work, Subcontractor shall be responsible for the insurance policy deductible amount applicable to damage to the Subcontractor's work and/or damage to other work caused by Subcontractor. If not covered under the Builder's Risk policy of insurance or any other property or equipment insurance required by the Contract Documents, Subcontractor shall procure and maintain at his own expense property and equipment insurance for portions of Subcontractor's work stored off the site or in transit.

If Owner or Contractor has not purchased Builder's Risk or equivalent insurance including the full insurable value of Subcontractor's work, then Subcontractor may procure such insurance at his own expense as will protect the interests of Subcontractor, and his subcontractors in the work. Such insurance shall also apply to any of the Owner's or Contractor's property in the care, custody, or control of Subcontractor.

8.4 **Health Insurance Certification.** Subcontractor hereby certifies that the Subcontractor and all applicable subcontractors and suppliers at any tier that is subject to UCA 63A-5-205 and Utah Administrative Code Rule R23-23, has and will maintain for the duration of this contract, an offer of qualified health insurance coverage for their employees; all in accordance with UCA 63A-5-205, and Utah Administrative Code Rule R23-23.

ARTICLE IX

9.1 **Default.** The following acts or omissions by Subcontractor shall constitute events of default ("Default") under this Subcontract and shall give rise to all rights and remedies for material breach of this Subcontract, including, without limitation, termination of this Subcontract:

(a) failure to perform the Work in strict compliance with this Subcontract and the Subcontract Documents.

(b) failure to promptly and diligently correct or replace Defective Work.

(c) failure to diligently perform the Work in compliance with the Project Schedule including, without limitation, failure to supply sufficient skilled laborers, materials, or equipment.

(d) failure to provide reasonable assurances of timely performance.

(e) failure to provide timely submittal information for review and approval as provided in the Subcontract Documents.

(f) failure or evidence of failure to timely pay workers, subcontractors, or health, welfare, pension or other benefit funds for labor, materials or equipment furnished as part of the Work.

(g) failure to keep the Property free from mechanic's liens.

(h) third party claims or evidence indicating, in Contractor's sole discretion, probable filing of such claims unless Subcontractor provides security against such claims in a form acceptable to Contractor.

(i) failure to pay prevailing wages, if required.

(j) assignment or subcontracting the majority of the Work without prior written authorization from Contractor.

(k) failure to perform the Work in strict compliance with the Laws and Regulations or the Safety Rules and Regulations.

(l) evidence that the Work can not be completed for the unpaid balance of the Subcontract Price, as determined by Contractor in its sole discretion.

(m) evidence that the Work will not be completed within the Subcontract Time, and/ or that the unpaid balance will not be adequate to cover actual or liquidated damages for the anticipated delay, as determined by Contractor in its sole discretion.

(n) damage to the work of Contractor or others on the Project.

(o) insolvency, inability to pay its current obligations, filing of any action seeking the protection of a bankruptcy court where this Subcontract is rejected by the trustee or the Subcontractor is unable to satisfy the requirements for assuming this Subcontract under the applicable provisions of the bankruptcy code, seeking to effect reorganization or workout with its creditors, filing in bankruptcy court by its creditors seeking to compel Subcontractor to reorganize or liquidate assets, appointment of a receiver or trustee related to any insolvency of Subcontractor, and garnishment of any amounts owed by Contractor to Subcontractor;

(p) any other material breach of this Subcontract or the Subcontract Documents; and

(q) any act, occurrence or event that places Subcontractor in default under any agreement between Contractor and Subcontractor other than this Subcontract.

9.2 **Notice of Default.** Upon written notice of Default, Subcontractor shall, within forty-eight (48) hours of receipt of such notice, take all actions requested by Contractor and such other actions as may be necessary to cure such Default. Subcontractor shall not be entitled to any adjustment in the Subcontract Price or the Subcontract Time as a result of any efforts to cure such Default.

9.3 If Subcontractor fails to cure any Default within forty-eight (48) hours after receipt of written notice of Default, Contractor may cure or remedy any Default by Subcontractor. Subcontractor shall reimburse Contractor and/or Contractor may backcharge Subcontractor for, any and all Losses it incurs, plus a reasonable allowance for profit, to cure or remedy any Default, or as a result of any other failure of Subcontractor to comply with the terms and conditions of this Subcontract or the Subcontract Documents. Contractor may offset against the Subcontract Price any Losses incurred as a result of a Default or any amounts owed to Contractor pursuant to this Section.

ARTICLE X

10.1 **Termination for Cause.** If (1) Subcontractor fails to cure any Default within forty-eight (48) hours after receipt of written notification of such Default, or (2) a Default threatens to cause immediate personal or bodily injury or death, Contractor may terminate Subcontractor's rights under this Subcontract in its entirety and Contractor shall have all the rights and remedies available under this Subcontract and at law or in equity including, without limitation, those remedies specified below.

If Contractor terminates this Subcontract for cause as provided herein, Contractor may, without prejudice to any other of its rights or remedies, perform and complete the Work and in connection therewith, Contractor may do any or all of the following:

10.1.1 exclude Subcontractor from the Project.

10.1.2 take possession of all materials, equipment, and tools intended for performance of the Work including materials and equipment at the Project site, stored materials and equipment, and materials and equipment in the course of preparation wherever located (without liability to Subcontractor for trespass or conversion),

10.1.3 accept assignment of Subcontractor's rights under all of Subcontractor's contracts with sub-subcontractors for performance of the Work, pursuant to Section 3.9 and/ or

10.1.4 otherwise obtain materials and equipment and employ persons which, in Contractor's sole discretion, are necessary to complete the Work.

Upon termination for cause as provided herein, Subcontractor shall not be entitled to receive any further payment until completion of all of the Work and acceptance of the entire Project. Subcontractor shall reimburse Contractor for all Losses it incurs to complete Subcontractor's Work, plus a reasonable allowance for overhead and profit. If the unpaid balance of the Subcontract Price exceeds the Contractor's Losses, plus allowance for overhead and profit, Contractor shall pay such excess to Subcontractor. If such Losses, overhead, and profit exceed the unpaid balance of the Subcontract Price, the Subcontractor shall pay the difference to Contractor. In addition, Contractor shall be entitled to such other and further remedies available at law or in equity.

10.2 **Suspension for Convenience.** Contractor may, without cause, suspend, delay or interrupt the Work in whole or in part for such period of time as the Contractor may determine and/ or as provided in the Subcontract Documents. Subject to the requirements and limitations of Article V, the Subcontract Price and Subcontract Time may be adjusted for increases in the cost and time to complete the Work caused by such suspension. No adjustment shall be made, however, to the extent that (a) performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Subcontractor is responsible, (b) an adjustment is made or denied under another provision of this Subcontract, or (c) Contractor is not entitled to a adjustment in the contract price and/ or the contract time under the General Contract on behalf of Subcontractor as a result of such suspension.

10.3 **Termination for Convenience.** The Contractor may, at any time, terminate this Subcontract for the convenience of Contractor and without cause. Subcontractor's sole and exclusive right to compensation for Losses resulting from such termination shall be the compensation actually received by Contractor from Owner on behalf of Subcontractor as a result of any such termination. Subcontractor shall not be entitled to any compensation for Losses or any other remedy under this Subcontract or for breach thereof as a result of such termination beyond such adjustment in the contract price and/ or the contract price to the Prime Contract received by Contractor from Owner on behalf of Subcontractor. Receipt by Contractor of such compensation is a condition precedent to Subcontractor's right, if any, to compensation for Losses resulting from such termination. Subcontractor's right to recover for such termination shall be limited to the compensation received by Contractor from Owner for such termination on behalf of Subcontractor.

ARTICLE XI

11.1 **Dispute Resolution.** Disputes, if any, between Subcontractor and Contractor arising out of or relating to this Subcontract or the Work shall be resolved as provided in this Article.

11.2 **Disputes Involving the Owner or the Architect.** Any disputes in which the Owner or the Architect is a party shall be governed by the dispute resolution procedures in the Subcontract Documents other than this Subcontract. If those Subcontract Documents contain no dispute resolution procedures, such disputes shall be resolved as provided in Section 11.3 below.

11.3 **Disputes Not Involving the Owner or the Architect.** At the sole and exclusive discretion of Contractor, all disputes in which neither the Owner nor the Architect is a party shall be resolved in (1) binding arbitration, or (2) litigation in a state or federal court of competent jurisdiction situated in the state of the location of the Project. If Contractor determines to resolve disputes under this Subcontract by binding arbitration, the following rules shall apply.

11.3.1 Binding Arbitration shall be pursuant to the current Construction Industry Arbitration Rules of the American Arbitration Association unless the parties mutually agree otherwise. A written demand for arbitration shall be filed with the American Arbitration Association and the other party within a reasonable time after the dispute or claim has arisen, but in no event after the applicable statute of limitations for a legal or equitable proceeding would have run.

11.3.2 Any Arbitration pursuant to this Subcontract may be joined or consolidated with any arbitration involving (1) any other person or entity necessary to resolve the claim, dispute or controversy, (2) the same transaction or series of related transactions as those in the Arbitration, or (3) a common issue of law or fact with those in the Arbitration creating the possibility of conflicting rulings by more than one arbitrator or panel of arbitrators. The location of the arbitration proceedings shall be in the state of the location of the Project. The arbitration award shall be final.

11.3.3 Arbitration pursuant to this Section shall be governed by the applicable version of the Uniform Arbitration Act in enacted by the state of the location of the Project. The arbitrator, in

determining an award, shall be without jurisdiction to enter any award not in conformity with the laws determined by the parties to be controlling pursuant to Section 12.4. The arbitrator shall have all authority necessary to enforce all the terms and conditions of this Subcontract and provide for all remedies available hereunder including, without limitation, interim relief, if appropriate. The arbitrator shall prepare a (1) reasoned award, or (2) findings of fact and conclusions of law, applying the governing laws to the facts of the case.

11.3.4 Notwithstanding the foregoing, the arbitrator shall be deemed to have exceeded the authority granted under this Subcontract if, and to the extent, an award does not comply with the requirements of this Subcontract. The Parties consent to the jurisdiction of the state and federal courts of the state in which the Project is located for the purposes of (1) enforcing the parties' obligation to arbitrate disputes, claims and controversies under this Subcontract, (2) determining the scope of the matters that are subject to arbitration, (3) requiring the joinder and/ or consolidation of matters subject to arbitration, and (4) enforcing and entering judgment upon the arbitration award entered by the arbitrator. Each Party waives any objection that it may now have or hereafter have to venue in such courts.

11.3.5 If any action or proceeding is brought in connection with this Subcontract, the prevailing party shall be entitled to recover its costs and reasonable expert and attorneys' fees.

ARTICLE XII

12.1 This Subcontract and the Subcontract Documents constitute the final, complete, and exclusive statement of the agreement between the parties, and supersedes and replaces in their entirety all prior oral or written agreements, including but not limited to, bids and bid acceptances. This Subcontract may not be altered, amended or extended, except by written agreement of the parties hereto executed by James Gramoll on behalf of Contractor.

12.2 This Subcontract shall inure to the benefit of and be binding upon the parties hereto, their successors and permitted assigns.

12.3 Delay by Contractor in enforcing any rights or remedies in the event of Default or a breach of any term or condition of this Subcontract or any other contract between Contractor or Subcontractor, shall not be construed as a waiver of such Default or breach. Payment by Contractor of progress payments or final payment shall not be construed as acceptance of any work for which payment is made or waiver of any Claims, rights, or remedies under this Subcontract.

12.4 This Subcontract shall be construed and interpreted as a whole in accordance with its fair meaning and in accordance with the laws of the state of the location of the Project. Under no circumstances, however, shall such laws be interpreted to apply conflict of laws principles to require the laws of another state to determine the interpretation or construction of this Subcontract.

12.5 **Performance Guaranty.** If Subcontractor operates as a corporation, limited liability company, partnership or a business entity other than as an individual or sole proprietor, this Subcontract will be signed by the President and Secretary of the corporation, the managing member(s), partners, or other authorized principals of Subcontractor's company, and the officers, managing member(s), partners, and/ or other principals signing this Subcontract on behalf of the corporation, limited liability company, partnership or other business entity do jointly and severally, guarantee to the Contractor the full and faithful performance of this Subcontract by Subcontractor, and do further agree, jointly and severally, that they shall be personally liable to Contractor for the full and faithful performance of Subcontractor's obligations under this Subcontract. Failure of Contractor to request a performance bond from Subcontractor shall not affect the obligation assumed by the officers, managing members, partners or other principals signing this Subcontract on behalf of Subcontractor.

IN WITNESS WHEREOF, this Subcontract has been executed by the Contractor and Subcontractor as of the day and the year below.

SUBCONTRACTOR: **(SUBCONTRACTOR NAME)**

By _____

Print _____

Its _____

Date: _____

CONTRACTOR: **GRAMOLL CONSTRUCTION COMPANY**

Auth _____

Print James C. Gramoll, President

Date: _____

05/18/2022 3:08:38 PM

Act ID	Description	Orig Dur	Rem Dur	Early Start	Early Finish	Total Float
1000	Pre Bid Walk	1d	1d	03MAY22 A	02MAY22	1d
1010	Questions due	2d	2d	02MAY22	03MAY22	0
1020	Bids Due	10d	10d	04MAY22	17MAY22	0
1030	Contracts with UU and subcontractors	25d	25d	18MAY22	21JUN22	0
1031	Submittals and shop drawings	15d	15d	22JUN22	13JUL22	18d
1050	Install temp facillities	10d	10d	01JUN22	14JUN22	0
1051	User move to temp facilities	5d	5d	15JUN22	21JUN22	0
1052	Utility disconnect	10d	10d	22JUN22	06JUL22	157d
1060	Abatement of building by others	7d	7d	22JUN22	30JUN22	0
1070	Building demo	10d	10d	01JUL22	15JUL22	0
1072	MEP bracing	10d	10d	01JUL22	15JUL22	0
1080	Abatement of windows by others	5d	5d	07JUL22	13JUL22	2d
1090	Demo West wall	12d	12d	18JUL22	02AUG22	0
1100	New building excavation	4d	4d	03AUG22	08AUG22	0
1110	West wall protection	5d	5d	03AUG22	09AUG22	133d
1120	Footing	10d	10d	09AUG22	22AUG22	0
1130	Foundation	5d	5d	23AUG22	29AUG22	0
1140	Backfill	3d	3d	30AUG22	01SEP22	0
1150	Underground MEPs	10d	10d	02SEP22	15SEP22	0
1160	SOG Prep and pour	7d	7d	16SEP22	26SEP22	0
1170	Steel erection	15d	15d	27SEP22	17OCT22	0
1180	SOD Pour	4d	4d	18OCT22	21OCT22	0
1190	Cold formed framing	15d	15d	24OCT22	11NOV22	0
1191	Glazing frames	10d	10d	14NOV22	25NOV22	0
1192	Vapor barrier	5d	5d	28NOV22	02DEC22	0
1200	Building MEP	15d	15d	03NOV22 *	23NOV22	4d
1210	Insulation	3d	3d	24NOV22	28NOV22	4d
1220	Drywall	10d	10d	29NOV22	12DEC22	4d
1230	Paint	5d	5d	13DEC22	19DEC22	4d
1240	MEP finishes	5d	5d	20DEC22	26DEC22	34d
1245	ACT tile	19d	19d	20DEC22	13JAN23	4d
1250	Masonry	20d	20d	05DEC22	30DEC22	0
1251	Exterior concrete	10d	10d	02JAN23	13JAN23	5d
1252	Asphalt repairs	5d	5d	16JAN23	20JAN23	5d
1260	Exterior metal panels	20d	20d	02JAN23	27JAN23	0
1270	New roof	10d	10d	14NOV22	25NOV22	5d
1280	Tie in existing roofing	5d	5d	05DEC22	09DEC22	15d
1290	Millwork	10d	10d	06DEC22	19DEC22	23d
1300	Flooring	5d	5d	09JAN23	13JAN23	20d
1310	Ceramic tile	10d	10d	02JAN23	13JAN23	4d
1320	Specialty	5d	5d	16JAN23	20JAN23	4d
1325	Substantial completion	1d	1d	27JAN23	27JAN23	0
1330	Punchlist	15d	15d	09JAN23	27JAN23	0
1350	Owner occupancy	10d	10d	30JAN23	10FEB23	0
1360	Temp services removed	10d	10d	30JAN23	10FEB23	0

Start date	02MAY22
Finish date	10FEB23
Data date	02MAY22
Run date	09MAY22
Page number	1A

Gramoll Construction
UU HTW Phase 4

- Early bar
- Progress bar
- Critical bar
- Summary bar
- Start milestone point
- Finish milestone point

THE UNIVERSITY OF UTAH

CODE ANALYSIS FORM – 2018 INTERNATIONAL BUILDING CODE

BUILDING IDENTIFICATION:	U303 –High Temperature Water Plant 1705 E. South Campus Dr. SLC UT 84112

CODE ANALYSIS COMPLETION DATE:	3/30/2022

PART 1

APPLICABLE CODE	YEAR	APPLICABLE CODE	YEAR
International Building Code (IBC)	2018	ADA (ADAAG)	2010
International Existing Building Code	2018	ICC/ANSI A117.1	2017
International Fire Code (IFC)	2018	NFPA 101 Life Safety Code (State)	2018
International Mechanical Code (IMC)	2018	NFPA 101 Life Safety Code (Federal)	2015
International Energy Conservation Code (IECC)	2018	NFPA 99 Health Care Facilities Code	2018
International Plumbing Code (IBC)	2018	FGI Health Care Guidelines	2018
National Electric Code	2020		

PART 2

Occupancy Group (Chapter 3)				Area (506)*5				Height (T504.3) *6		Stories (T504.4) *6			
Floor	Name	Group	(T601) Const. Type (*1)	Tabular NS (T506.2)	Tabular SM or S1 (T506.2)	Aa (*2)	Actual ft²	Tabular T504.3 ft	Actual ft	Tabular (T504.4)	Actual	(508) Mixed Use Type (*3)	(508.4.2) *4 Area Ratio
Basement - Floor Total:													
1st - Floor Total:													
	Office	B	IIB		92,000	95,910	2,250	75	17	4	1		
2nd Floor Total:													
3rd Floor Total:													
Building Total (*2)							2,250						

*(*1) Construction Type shall be the most restrictive occupancy requirement for the entire building (508.3 & 508.4)*
*(*2) Area- Total building Area dependent on Single or Mixed Occupancy Building (506.2.1 through 506.2.4) & Frontage Increase (506.3)*
*(*3) Mixed Use - IAO=Incidental Accessory Occupancy / AO=Accessory Occupancy / SO=Separated Occupancies / NSO=Nonseparated Occupancies; gsf= gross square feet; nsf= net square feet; (E) = Existing*
*(*4) IBC Section 508.4.2: In each story, the building area shall be such that the sum of the ratios of the actual building area of each separated occupancy divided by the allowable building area of each separated occupancy shall not exceed 1.*
*(*5) 506.2.4 Mixed-occupancy, multistory buildings more than 3 stories above grade plan: Total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories shall not exceed three for NS and four for S.*
*(*6) IBC 504.2 Mixed occupancy: In a building containing mixed occupancies in accordance with Section 508, no individual occupancy shall exceed the height and number of story limits specified in this section for the applicable occupancies.*

PART 3 - ALLOWABLE AREA DETERMINATION (506.2.1 through 506.2.4 & 506.3)

FRONTAGE INCREASE: If = [F/P- 0.25]W/30 = (Provide Analysis)

SINGLE-OCCUPANCY, ONE STORY BUILDINGS (506.2.1):
Allowable Area: Aa = At + (NS × If) = (Provide Analysis)
Level X, X Occupancy: Aa = At + (NS × If) = SF

I_f = [F/P – 0.25] W/30
I_f = [121'/284' – 0.25] W/30
I_f = [0.42 – 0.25] 30/30
I_f = 0.17 x 1
I_f = 0.17

Aa = [At + (NS x I_f) Sa
Aa = [92,000 + (23,000 x 0.17) x 1
Aa = [92,000 + 3,910] x 1
Aa = 95,910

PART 4 - GRADE PLANE ELEVATION & HEIGHT & STORIES (504)

BUILDING WALL	AVERAGE ELEVATION	GRADE PLANE ELEVATION
NORTH	17'-0"	17'-0"
SOUTH	17'-0"	17'-0"
EAST	17'-0"	17'-0"
WEST	17'-0"	17'-0"
	TOTAL BUILDING G.P.E.	17'-0"

STORY	FINISHED FLOOR ELEVATION	STORY ABOVE G.P.E.	HEIGHT
BASEMENT	N/A		
1ST FLOOR	0'	1	17'
2ND FLOOR	N/A		
3RD FLOOR			
TOTAL BUILDING		1-STORIES	17'-0"

PART 5 - AUTOMATIC FIRE SPRINKLER (903 & T903.2.11.6)

ITEM	REFERENCE	COMMENTS
Required		

PART 6 - OCCUPANCY SEPARATIONS (T508.4)

OCCUPANCY/OCCUPANCY	RATING	IBC/UL DESIGN #
B	Not required	

PART 7 - OTHER BUILDING ELEMENTS (T601 and T602)

ELEMENT	MATERIAL	RATING	IBC/UL DESIGN #
Interior Bearing Wall		0	
Interior Non-Bearing Wall	Metal stud assembly	0	N/A
Structural Frame	Steel	0	N/A
Exterior Structural Frame	Steel	0	N/A
Shaft Enclosure a,b		N/A	N/A
Floor / Ceiling Assembly		N/A	N/A
Roof / Ceiling Assembly	Steel, metal decking, rigid insulation	0	N/A
Vertical Exit Enclosure a,b		N/A	N/A

a. *Fire-resistance rating not less than the floor assembly penetrated (713.4) (1023.2).*
b. *2 hours where connecting four stories or more and 1 hour where connecting less than four stories, including basements. (713.4) (1023.2).*

8

PART 8 - EXTERIOR WALL & OPENING PROTECTION (T705.8)

WALL LOCATION	PROTECTED	UNPROTECTED	PARAPET REQ'D (705.11)
NORTH	N/A		
SOUTH	N/A		
EAST	N/A		
WEST	N/A		

PART 9 - EXIT REQUIREMENTS

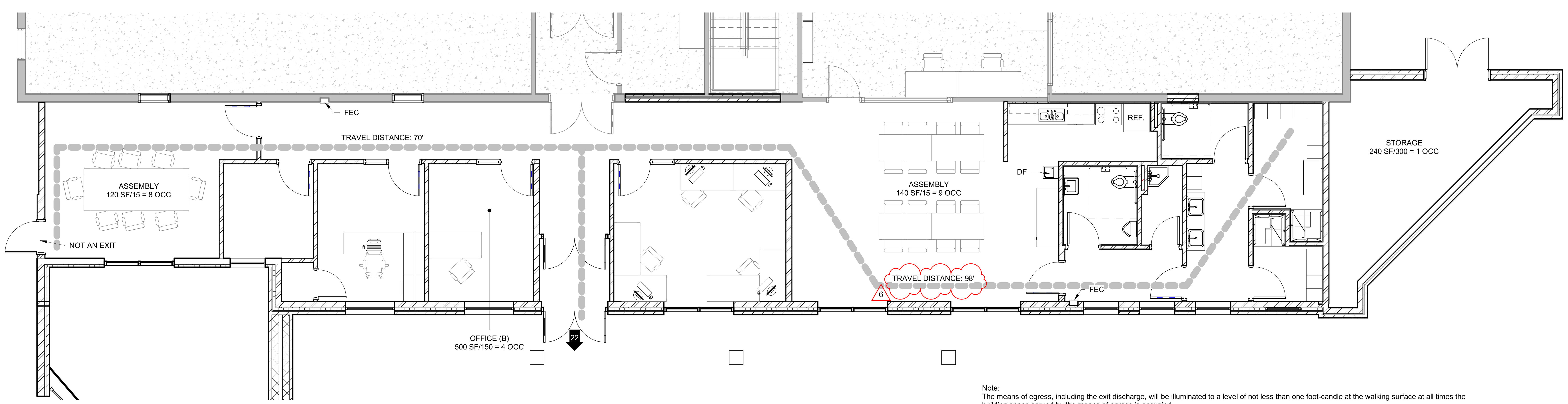
FLOOR LEVEL	ROOM OCCUPANCY GROUPS	AREA	OCCUPANT LOAD FACTOR (T1004.5)	# OF OCCUPANTS (1004)	# OF EXITS (1006)	REQ' D EGRESS WIDTH (1005)	REQ' D STAIR WIDTH (1005.3)	REQ' D AISLE WIDTH (1018)	COMMON PATH OF TRAVEL DISTANCE (T1006.2.1) (Worst case)	TOTAL TRAVEL DISTANCE (1017) (Worst case)
Level A Total:										
Level 1 Total:										
	Business office	500	150	4	1					
	Assembly	260	15	18	1					
Level 2 Total:										
Level 3 Total:										
Building Total:		760		22	1	N/A	N/A	N/A	26'	98'

PART 10 - ADDITIONAL REQUIREMENTS

ACCESSIBLE MEANS OF EGRESS (1009):	
ACCESSIBLE ROUTE (1104 & INTERNATIONAL EXISTING BUILDING CODE):	Complied
SPECIAL OCCUPANCY REQUIREMENTS (CHAPTER 4):	Complied

PLUMBING FIXTURES (T 2902.1)

TOTAL NUMBER OF REQUIRED FIXTURES:											
		WATER CLOSETS					LAVATORIES			DRINKING FOUNTAINS	
OCCUPANCY	OCC. LOAD	RATIO	MEN	Urinals	RATIO	WOMEN	RATIO	MEN	WOMEN	RATIO	TOTAL
A3		1 PER 125	0.0	0.0	1 PER 65	0.0	1 PER 200	0.0	0.0	1 PER 1000	0
B	22	1 PER 25 <50	0.2	0.2	1 PER 25 <50	0.4	1 PER 40 <80	0.3	0.3	1 PER 100	0.22
		1 PER 50 >50	0.0	0.0	1 PER 50 >50	0.0	1 PER 80 >80	0.0	0.0		
E		1 PER 50	0.0	0.0	1 PER 50	0.0	1 PER 50	0.0	0.0	1 PER 100	0
I2 - Hosp, Ambul		1 PER ROOM			1 PER ROOM		1 PER ROOM			1 PER 100	0
I2 - Staff		1 PER 25	0.0	0.0	1 PER 25	0.0	1 PER 35	0.0	0.0	1 PER 100	0
I2 - Visitors		1 PER 75	0.0	0.0	1 PER 75	0.0	1 PER 100	0.0	0.0	1 PER 500	0
S1, S2		1 PER 100	0.0	0.0	1 PER 100	0.0	1 PER 100	0.0	0.0	1 PER 1000	0
TOTAL REQUIRED			1	1		1		1	1		1
TOTAL PROVIDED			1	1		1		1	1		1



Note:
The means of egress, including the exit discharge, will be illuminated to a level of not less than one foot-candle at the walking surface at all times the building space served by the means of egress is occupied

A2 OPERATING LEVEL LIFE SAFETY PLAN
SCALE: 3/16" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue - Salt Lake City, Utah 84104
O 801.521.6186 - FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · #5340047-0301 · LICENSED ARCHITECT · 1/18/22

△	DATE	REVISION
6	3-30-22	Phase 4 RC #1
8	4-15-22	Phase 4 RC #2

PROJECT NUMBER 18136

CODE REVIEW

6

G-003-4

1. ALL CONSTRUCTION MUST STRICTLY FOLLOW THE STANDARDS AND SPECIFICATIONS SET FORTH BY: DFCM, INDIVIDUAL PRODUCT MANUFACTURERS, AMERICAN PUBLIC WORKS ASSOCIATION (APWA), AND THE DESIGN ENGINEER. THE ORDER LISTED ABOVE IS ARRANGED BY SENIORITY. IF A CONSTRUCTION PRACTICE IS NOT SPECIFIED BY ANY OF THE LISTED SOURCES, CONTRACTOR MUST CONTACT DESIGN ENGINEER FOR DIRECTION.
2. PROJECT MUST FOLLOW THE BUILDING CODES: 2015 IBC, 2015 IEBC, 2015 IMC, 2015 IPC, 2015 IECC, 2017 NEC, 2010 ADA (ADAAG), 2009 ICC A117.1 AND UTAH CODE TITLE 15–A.
3. ANY AREA OUTSIDE THE LIMIT OF WORK THAT IS DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT NO COST TO OWNER.
4. CONSULT ALL OF THE DRAWINGS AND SPECIFICATIONS FOR COORDINATION REQUIREMENTS BEFORE COMMENCING CONSTRUCTION.
5. AT ALL LOCATIONS WHERE EXISTING PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING PAVEMENT SHALL BE SAW CUT TO A CLEAN, SMOOTH EDGE.
6. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE MOST RECENT, ADOPTED EDITION OF ADA ACCESSIBILITY GUIDELINES
7. CONTRACTOR MUST VERIFY ALL EXISTING CONDITIONS BEFORE BIDDING AND BRING UP ANY QUESTIONS BEFOREHAND.
8. CONTRACTOR IS RESPONSIBLE FOR SCHEDULING AND NOTIFYING ENGINEER OR INSPECTING AUTHORITY 72 HOURS IN ADVANCE OF COVERING UP ANY PHASE OF CONSTRUCTION REQUIRING OBSERVATION.
9. ALL DIMENSIONS, GRADES & UTILITY DESIGNS SHOWN ON THE PLANS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION FOR NECESSARY PLAN OR GRADE CHANGES.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FLAGGING, CAUTION SIGNS, LIGHTS, BARRICADES, FLAGMEN, AND ALL OTHER DEVICES NECESSARY FOR PUBLIC SAFETY.
11. THE CONTRACTOR SHALL, AT THE TIME OF BIDDING, AND, THROUGHOUT THE PERIOD OF THE CONTRACT, BE LICENSED IN THE STATE OF UTAH AND SHALL DEMONSTRATE CURRENT BONDING ABILITY FOR AN AMOUNT EQUAL TO OR GREATER THAN THE AMOUNT BID AND TO DO THE TYPE OF WORK CONTEMPLATED IN THE PLANS AND SPECIFICATIONS. CONTRACTOR SHALL BE SKILLED AND REGULARLY ENGAGED IN THE GENERAL CLASS AND TYPE OF WORK CALLED FOR IN THE PLANS AND SPECIFICATIONS.
12. CONTRACTOR SHALL INSPECT THE SITE OF THE WORK PRIOR TO BIDDING TO SATISFY THEMSELVES BY PERSONAL EXAMINATION OR BY SUCH OTHER MEANS AS THEY MAY PREFER, OF THE LOCATION OF THE PROPOSED WORK, AND OF THE ACTUAL CONDITIONS OF AND AT THE SITE OF WORK. IF, DURING THE COURSE OF THEIR EXAMINATION, A BIDDER FINDS FACTS OR CONDITIONS WHICH APPEAR TO THEM TO BE IN CONFLICT WITH THE LETTER OR SPIRIT OF THE PROJECT PLANS AND SPECIFICATIONS, THEY SHALL CONTACT THE ENGINEER FOR ADDITIONAL INFORMATION AND EXPLANATION BEFORE SUBMITTING THEIR BID. SUBMISSION OF A BID BY THE CONTRACTOR SHALL CONSTITUTE ACKNOWLEDGMENT THAT, IF AWARDED THE CONTRACT, THEY HAVE RELIED AND ARE RELYING ON THEIR OWN EXAMINATION OF (1) THE SITE OF THE WORK, (2) ACCESS TO THE SITE, AND (3) ALL OTHER DATA AND MATTERS REQUISITE TO THE FULFILLMENT OF THE WORK AND ON THEIR OWN KNOWLEDGE OF EXISTING FACILITIES ON AND IN THE VICINITY OF THE SITE OF THE WORK TO BE CONSTRUCTED UNDER THIS CONTRACT. THE INFORMATION PROVIDED BY THE ENGINEER IS NOT INTENDED TO BE A SUBSTITUTE FOR, OR A SUPPLEMENT TO THE INDEPENDENT VERIFICATION BY THE CONTRACTOR TO THE EXTENT SUCH INDEPENDENT INVESTIGATION OF SITE CONDITIONS IS DEEMED NECESSARY OR DESIRABLE BY THE CONTRACTOR. CONTRACTOR SHALL ACKNOWLEDGE THAT THEY HAVE NOT RELIED SOLELY UPON OWNER OR ENGINEER FURNISHED INFORMATION REGARDING SITE CONDITIONS IN PREPARING AND SUBMITTING THEIR BID.
13. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL WATER, POWER, SANITARY FACILITIES AND TELEPHONE SERVICES AS REQUIRED FOR THE CONTRACTORS USE DURING CONSTRUCTION.
14. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY FIELD CHANGES MADE WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE OWNER, ENGINEER, DFCM AND/OR THE UNIVERSITY OF UTAH.
15. THE CONTRACTOR SHALL EXERCISE DUE CAUTION AND SHALL CAREFULLY PRESERVE BENCH MARKS, CONTROL POINTS, REFERENCE POINTS AND ALL SURVEY STAKES, AND SHALL BEAR ALL EXPENSES FOR REPLACEMENT AND/OR ERRORS CAUSED BY THEIR UNNECESSARY LOSS OR DISTURBANCE.
16. THE CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOBSITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATELY SCHEDULING INSPECTION AND TESTING OF ALL FACILITIES CONSTRUCTED UNDER THIS CONTRACT. ALL TESTING SHALL CONFORM TO THE UTAH DEPARTMENT OF FACILITIES MANAGEMENT REQUIREMENTS. ALL TESTING AND INSPECTION SHALL BE PAID FOR BY THE OWNER; ALL RE–TESTING AND/OR RE– INSPECTION SHALL BE PAID FOR BY THE CONTRACTOR.
18. THE CONTRACTOR SHALL MAINTAIN A NEATLY MARKED SET OF FULL–SIZE AS–BUILT RECORD DRAWINGS SHOWING THE FINAL LOCATION AND LAYOUT OF ALL STRUCTURES AND OTHER FACILITIES. AS–BUILT RECORD DRAWINGS SHALL REFLECT CHANGE ORDERS, ACCOMMODATIONS, AND ADJUSTMENTS TO ALL IMPROVEMENTS CONSTRUCTED. WHERE NECESSARY, SUPPLEMENTAL DRAWINGS SHALL BE PREPARED AND SUBMITTED BY THE CONTRACTOR. PRIOR TO ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL DELIVER TO THE ENGINEER, ONE SET OF NEATLY MARKED AS–BUILT RECORD DRAWINGS SHOWING THE INFORMATION REQUIRED ABOVE. AS–BUILT RECORD DRAWINGS SHALL BE REVIEWED AND THE COMPLETE AS–BUILT RECORD DRAWING SET SHALL BE CURRENT WITH ALL CHANGES AND DEVIATIONS REDLINED AS A PRECONDITION TO THE FINAL PROGRESS PAYMENT APPROVAL AND/OR FINAL ACCEPTANCE.
19. WHERE THE PLANS OR SPECIFICATIONS DESCRIBE PORTIONS OF THE WORK IN GENERAL TERMS BUT NOT IN COMPLETE DETAIL, IT IS UNDERSTOOD THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIALS AND WORKMANSHIP OF THE FIRST QUALITY ARE TO BE USED.
20. THE CONTRACTOR SHALL BE SKILLED AND REGULARLY ENGAGED IN THE GENERAL CLASS AND TYPE OF WORK CALLED FOR IN THE PROJECT PLANS AND SPECIFICATIONS. THEREFORE, THE OWNER IS RELYING UPON THE EXPERIENCE AND EXPERTISE OF THE CONTRACTOR, IT SHALL BE EXPECTED THAT PRICES PROVIDED WITHIN THE CONTRACT DOCUMENTS SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY AND PROPER FOR THE WORK CONTEMPLATED AND THAT THE WORK BE COMPLETED IN ACCORDANCE WITH THEIR TRUE INTENT AND PURPOSE. THE CONTRACTOR SHALL BE COMPETENT, KNOWLEDGEABLE AND HAVE SPECIAL SKILLS IN THE NATURE, EXTENT AND INHERENT CONDITIONS OF THE WORK TO BE PERFORMED. CONTRACTOR SHALL ALSO ACKNOWLEDGE THAT THERE ARE CERTAIN PECULIAR AND INHERENT CONDITIONS EXISTENT IN THE CONSTRUCTION OF THE PARTICULAR FACILITIES, WHICH MAY CREATE, DURING THE CONSTRUCTION PROGRAM, UNUSUAL OR UNSAFE CONDITIONS HAZARDOUS TO PERSONS, PROPERTY AND THE ENVIRONMENT. CONTRACTOR SHALL BE AWARE OF SUCH PECULIAR RISKS AND HAVE THE SKILL AND EXPERIENCE TO FORESEE AND TO ADOPT PROTECTIVE MEASURES TO ADEQUATELY AND SAFELY PERFORM THE CONSTRUCTION WORK WITH RESPECT TO SUCH HAZARDS.
21. THE CONTRACTOR SHALL PROVIDE ALL SHORING, BRACING, SLOPING OR OTHER PROVISIONS NECESSARY TO PROTECT WORKMEN FOR ALL AREAS TO BE EXCAVATED TO A DEPTH OF 4 FEET OR MORE. FOR EXCAVATIONS 4 FEET OR MORE IN DEPTH, THE CONTRACTOR SHALL COMPLY WITH INDUSTRIAL COMMISSION OF UTAH SAFETY ORDERS ALONG WITH ANY LOCAL CODES OR ORDINANCES.
22. ALL EXISTING GATES AND FENCES TO REMAIN UNLESS OTHERWISE NOTED ON PLANS. PROTECT ALL GATES AND FENCES FROM DAMAGE.
23. PRIOR TO STARTING EXCAVATION, A DIGGING PERMIT MUST BE REQUESTED THROUGH THE PROJECT MANAGER 5 WORKING DAYS PRIOR TO START. THE DIGGING PERMIT WILL ALSO SERVE AS NOTIFICATION FOR THE REQUEST TO LOCATE EXISTING UTILITIES. UTILITY SHUTDOWNS, ROAD AND SIDEWALK CLOSURES REQUIRE A 72 HOUR MINIMUM NOTICE PRIOR THE THE SHUTDOWN TO THE CAMPUS DESIGN AND CONSTRUCTION PROJECT MANAGER.
24. THE CONTRACTOR SHALL CLEAR AND GRUB PRIOR TO EXCAVATION REMOVING ALL PLANT LIFE, GRASS, ROOT SYSTEMS, AND ALL SURFACE DEBRIS AS NEEDED TO PROVIDE A CLEAN SUB–BASE FOR THE WORK.
25. NO ON SITE BURNING WILL BE PERMITTED.
26. LANDSCAPING FEATURES AND PLANT GROWTH DESIGNATED TO REMAIN AS FINAL LANDSCAPING ARE TO BE PROTECTED. ALL TREES REMOVED AS PART OF THE CONSTRUCTION MUST BE REPLACED ON A 2 FOR 1 BASIS UNLESS NOTED OTHERWISE. CONTACT LANDSCAPE AND MAINTENANCE DEPARTMENT AT 801–581–5358 FOR DETERMINATION OF TREE TYPE, SIZE, AND LOCATION REQUIRED. ONLY TREES IDENTIFIED FOR REMOVAL ON THE DRAWINGS ARE TO BE REMOVED.
27. CONTRACTOR SHALL POT HOLE ALL UTILITIES TO DETERMINE IF CONFLICTS EXIST PRIOR TO BEGINNING ANY EXCAVATION. NOTIFY THE DFCM, UNIVERSITY OF UTAH, AND THE ENGINEER OF ANY CONFLICTS. CONTRACTOR SHALL VERIFY LOCATION AND INVERTS OF EXISTING UTILITIES TO WHICH NEW UTILITIES WILL BE CONNECTED.
28. CONTRACTOR SHALL PROVIDE AND MAINTAIN AT ALL TIMES AMPLE MEANS AND DEVICES WITH WHICH TO REMOVE PROMPTLY AND TO PROPERLY DISPOSE OF ALL WATER ENTERING THE TRENCH EXCAVATION.
29. THE CONTRACTOR SHALL NOTIFY UNIVERSITY OF UTAH SURVEYOR. IN WRITING AT LEAST 48 HOURS PRIOR TO BACKFILLING OF ANY PIPE.
30. CONTRACTOR SHALL SUBMIT A SWPPP FOR APPROVAL TO UNIVERSITY PLANNING DESIGN AND CONSTRUCTION. SEE SHEET C–500.
31. THE CONTRACTOR SHALL EXERCISE DUE CAUTION AND SHALL CAREFULLY PRESERVE BENCH MARKS, CONTROL POINTS, REFERENCE POINTS AND ALL SURVEY STAKES, AND SHALL BEAR ALL EXPENSES FOR REPLACEMENT AND/OR ERRORS CAUSED BY THEIR UNNECESSARY LOSS OR DISTURBANCE.
32. IF EXISTING IMPROVEMENTS NEED TO BE DISTURBED AND/OR REMOVED FOR THE PROPER PLACEMENT OF IMPROVEMENTS TO BE CONSTRUCTED BY THESE PLANS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING EXISTING IMPROVEMENTS FROM DAMAGE. COST OF REPLACING OR REPAIRING EXISTING IMPROVEMENTS SHALL BE INCLUDED IN THE PRICE BID FOR ITEMS REQUIRING REMOVAL AND/OR REPLACEMENT OF EXISTING IMPROVEMENTS. REPLACEMENT WILL BE AT NO COST TO THE OWNER.
33. WHENEVER EXISTING FACILITIES ARE REMOVED, DAMAGED, BROKEN, OR CUT IN THE INSTALLATION OF THE WORK COVERED BY THESE PLANS OR SPECIFICATIONS, SAID FACILITIES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE, WITH MATERIALS EQUAL TO OR BETTER THAN THE MATERIALS USED IN THE ORIGINAL EXISTING FACILITIES. THE FINISHED PRODUCT SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER AND THE ENGINEER. LIGHTING CONDUIT THAT IS BROKEN SHALL BE REPAIRED OR REPLACED AND NEW WIRE SHALL BE PULLED THE ENTIRE DISTANCE BETWEEN LIGHTS. CONCRETE SIDEWALK AND PAVEMENT SHALL BE REPLACED TO THE NEAREST EXISTING JOINT. LIGHTING TO BE OPERATIONAL BY THE END OF EACH DAY.

UTILITY NOTES

1. UNLESS OTHERWISE NOTED, ALL DRY UTILITIES ARE ASSUMED TO BE 3' BELOW EXISTING GRADES TO TOP OF CONDUIT. ALL WATER LINES ARE ASSUMED TO BE 4' BELOW EXISTING GRADE TO TOP OF PIPE. ALL STORM AND SANITARY LINES ARE BASED ON SURVEYED INVERT DATA. CONTRACTOR TO POTHOLE ALL UTILITIES CROSSINGS, VERIFY ELEVATION INFORMATION AND CONTACT ENGINEER IF ELEVATIONS ARE DIFFERENT FROM THOSE SHOWN IN THESE PLANS.
2. CONTRACTOR IS TO COORDINATE LOCATION OF NEW "DRY UTILITIES" WITH THE APPROPRIATE UTILITY COMPANY. INCLUDING BUT NOT LIMITED TO: TELEPHONE SERVICE, GAS SERVICE, CABLE, POWER, INTERNET.
3. EXISTING UTILITIES HAVE BEEN SHOWN ON THE PLANS USING PLANS PROVIDED BY UNIVERSITY STUDENT HOUSING.
4. ALL VALVES AND MANHOLES COVERS SHALL BE RAISED OR LOWERED TO MEET FINISHED GRADE.
5. ENSURE POSITIVE DRAINAGE FROM ANY EXISTING OR PROPOSED UTILITY STRUCTURES.
6. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING STRUCTURES, DEBRIS, WASTE AND OTHER UNSUITABLE FILL MATERIAL FOUND WITHIN THE LIMITS OF EXCAVATION.
7. EXISTING UTILITIES HAVE BEEN SHOWN ON THE PLANS. LITTLE SUBSURFACE EXPLORATION HAS BEEN COMPLETED. CONTRACTOR IS RESPONSIBLE FOR OBTAINING RED STAKES BY CONTACTING LENARD BARNEY @ 801–718–0804. IT WILL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO DIRECTLY CONTACT ANY OTHER UTILITY COMPANIES THAT ARE NOT MEMBERS OF BLUE STAKES. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO PROTECT ALL EXISTING UTILITIES SO THAT NO DAMAGE RESULTS TO THEM DURING THE PERFORMANCE OF THIS CONTRACT. ANY REPAIRS NECESSARY TO DAMAGED UTILITIES SHALL BE PAID FOR BY THE CONTRACTOR. THE CONTRACTOR SHALL BE REQUIRED TO COOPERATE WITH OTHER CONTRACTORS AND UTILITY COMPANIES INSTALLING NEW STRUCTURES, UTILITIES AND SERVICE TO THE PROJECT
8. CARE SHOULD BE TAKEN IN ALL EXCAVATIONS DUE TO POSSIBLE EXISTENCE OF UNRECORDED UTILITY LINES. EXCAVATION REQUIRED WITHIN PROXIMITY OF EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT HIS EXPENSE. THE CONTRACTOR SHALL BEAR ALL EXPENSES FOR THE REPLACEMENT OF THE DAMAGED UTILITIES WHOSE LOCATION HAS BEEN IDENTIFIED BY THE UNIVERSITY OR BLUESTAKING.
9. ALL BOLTED FITTINGS MUST BE GREASED AND WRAPPED.
10. IF AN EMERGENCY SHUT–DOWN OF A UTILITY IS REQUIRED CALL UNIVERSITY OF UTAH PLANT OPERATIONS DISPATCH AT (801) 581–7221
11. IF THE CONTRACTOR LOCATES ANY UNIDENTIFIED UTILITIES, PLEASE CONTACT LENARD BARNEY @ 801–718–0804.

△1

ABBREVIATIONS

APWA	AMERICAN PUBLIC WORKS ASSOCIATION	FH	FIRE HYDRANT	PP	POWER POLE
AC	ASPHALTIC CONCRETE	FL	FLOW LINE	PRC	POINT OF REVERSE CURVE
&	AND	FT	FEET	PRV	PRESSURE REDUCING VALVE
APPR.	APPROXIMATELY	HP	HIGH POINT	PSI	POUNDS PER SQUARE INCH
ARV	AIR RELEASE VALVE	HORIZ	HORIZONTAL	PT	POINT OF TANGENT
@	AT	HT	HIGH TEMPERATURE	PVC	POLYVINYL CHLORIDE
BDRY	BOUNDARY	HTW	HIGH TEMPERATURE WATER	PUE	PUBLIC UTILITY EASEMENT
BG	FINISH GRADE AT BUILDING	HV	HIGH VOLTAGE	PVT	POINT OF VERTICAL TANGENT
BVC	BEGIN VERTICAL CURVE	HYD	HYDRANT	PVI	POINT OF VERTICAL INTERSECTION
BRG	BEARING	ID	INSIDE DIAMETER	R	RADIUS
BW	BOTTOM OF WALL	IE	INVERT ELEVATION	RCP	REINFORCED CONCRETE PIPE
CAV	COMBINATION AIR VALVE	IRR	IRRIGATION	REF	REFERENCE
CB	CATCH BASIN	L	LENGTH	ROW	RIGHT–OF–WAY
CL OR ℄	CENTERLINE	LF	LINEAR FEET	SS	SANITARY SEWER
CMP	CORRUGATED METAL PIPE	LP	LOW POINT	SD	STORM DRAIN
COB	CLEANOUT BOX	MAX	MAXIMUM	SW	SIDEWALK
CONC	CONCRETE	MH	MANHOLE	SCH	SCHEDULE
DET	DETAIL	MIN	MINIMUM	SF	SQUARE FEET
DIA	DIAMETER	MJ	MECHANICAL JOINT	STA	STATION
DIP	DUCTILE IRON PIPE	N	NORTH	STD	STANDARD
DIST	DISTRICT	NIC	NOT IN CONTRACT	TA	TOP OF ASPHALT
DWG	DRAWING	NTS	NOT TO SCALE	TBC	TOP BACK OF CURB
EA	EACH	OAE	OR APPROVED EQUAL	TC	TOP OF CURB
EG	EXISTING GRADE	OC	ON CENTER	TEMP	TEMPORARY
EP	EDGE OF PAVEMENT	OH	OVERHEAD	TG	TOP OF GRATE
ELEV	ELEVATION	P	POWER	TW	TOP OF WALL
ESMT	EASEMENT	PC	POINT OF CURVATURE	TYP	TYPICAL
EXIST.	EXISTING	PI	POINT OF INTERSECTION	VAR	VARIES
FF	FINISH FLOOR	PL	PROPERTY LINE	W	WATER
FG	FINISH GRADE	POC	POINT ON CURVE	W/	WITH

LEGEND:

EXISTING CONCRETE PAVEMENT TO REMAIN
EXISTING ASPHALT PAVEMENT TO REMAIN
EXISTING BUILDING/STRUCTURE TO REMAIN
CONCRETE PAVEMENT TO BE DEMOLISHED
ASPHALT PAVEMENT TO BE DEMOLISHED
EXISTING LANDSCAPE TO REMAIN
PROPOSED ASPHALT
FUTURE BUILDING EXPANSION
PROPOSED CONCRETE PAVEMENT
PROPOSED VEHICULAR CONCRETE PAVEMENT
ALTERNATE #1

LIMITS OF DISTURBANCE
SAWCUT LINE
4"SS — 4"SS PROPOSED SEWER LINE
COM — COM EXISTING COMMUNICATION LINE
UGE — UGE EXISTING UNDERGROUND ELECTRICAL LINE
T — T EXISTING TELECOMMUNICATION LINE
W — W EXISTING WATER PIPE
SD — SD EXISTING STORM DRAIN PIPE
SS — SS EXISTING SANITARY SEWER PIPE
G — G EXISTING GAS LINE
EXISTING BUILDING LINE

WV EXISTING WATER VALVE
E EXISTING ELECTRICAL BOX
EXISTING LIGHT POLE
EXISTING STORM DRAIN INLET
EXISTING WATER FIRE HYDRANT
W EXISTING WATER MANHOLE
WSO EXISTING WATER SHUT OFF
EXISTING STORM DRAIN CATCH BASIN
D EXISTING STORM DRAIN MANHOLE
S EXISTING SEWER MANHOLE
EXISTING PVC PIPE AND CAP
EXISTING TREES
BO EXISTING BOLLARD
BO EXISTING BOLLARD TO BE REMOVED

FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
© 801.521.6186 • FFKR.COM

TALISMAN
CIVIL CONSULTANTS
1588 SOUTH MAIN STREET
SUITE 200
SALT LAKE CITY, UT 84115
801.743.1300

U OF U BLDG. 303 SEISMIC UPGRADE, PROJECT # 22508 - PHASE 4
SALT LAKE CITY UTAH
-
CONSTRUCTION DOCUMENTS - 1-17-2022

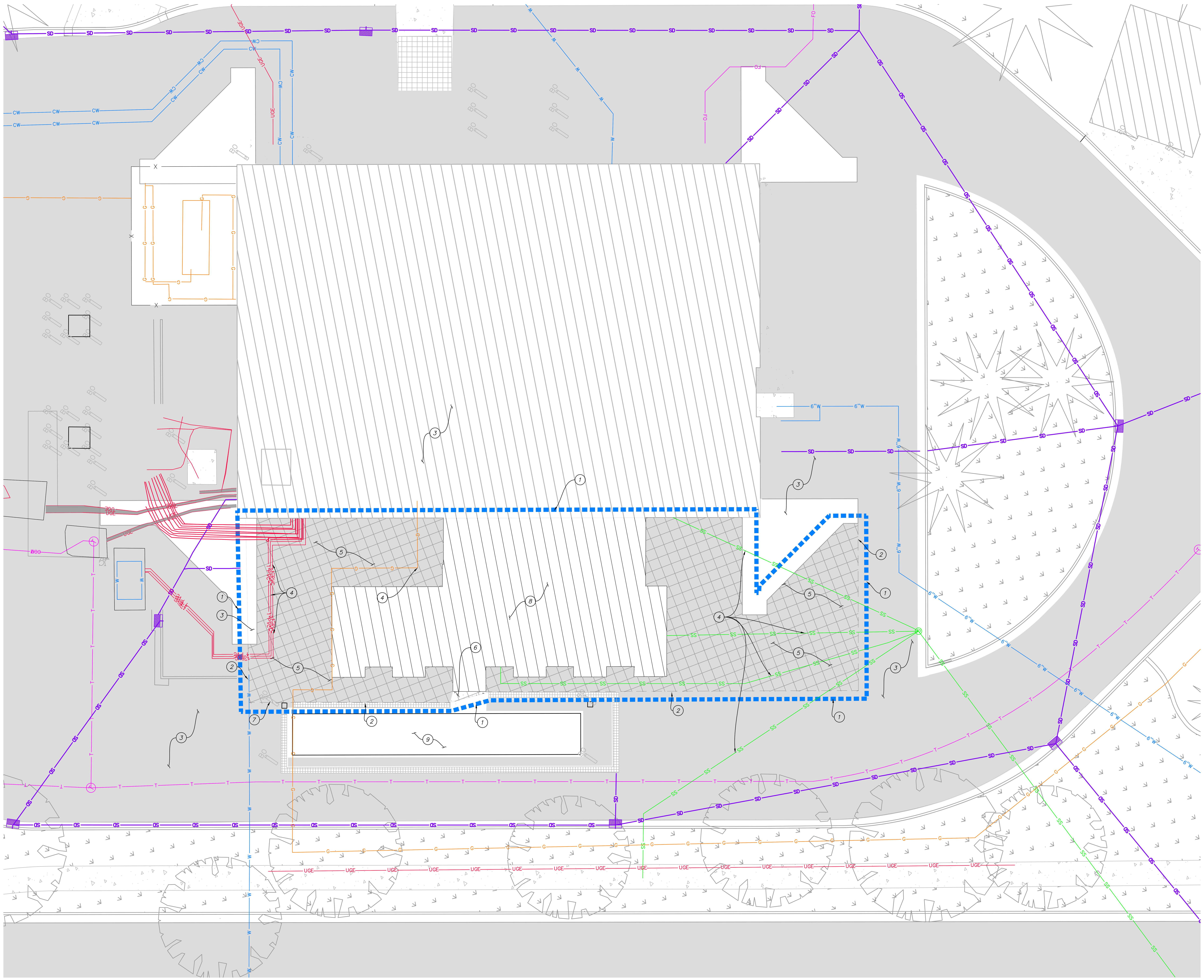
REGISTERED PROFESSIONAL ENGINEER
No. 10187523-2202
JEFFREY R. FAIMER
1-17-22
STATE OF UTAH

△	DATE	REVISION
1	5-17-2022	PHASE 4 ADDENDUM #1

PROJECT NUMBER 19-800.66

GENERAL CIVIL NOTES PHASE 4

C001



GENERAL NOTES:

1. EXISTING UTILITY INFORMATION SHOWN IS FOR INFORMATIONAL PURPOSES ONLY. IT IS DERIVED FROM RECORD DRAWINGS AND MAY NOT BE LOCATED CORRECTLY AND IS NOT ALL INCLUSIVE. CONTRACTOR SHALL FIELD LOCATE ALL UTILITIES BEFORE BEGINNING DEMOLITION/CONSTRUCTION AND NOTIFY ENGINEER WHEN UNEXPECTED UTILITIES ARE DISCOVERED.

2. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR LOCATING AND PROTECTING FROM DAMAGE ALL EXISTING UTILITIES AND IMPROVEMENTS WHETHER OR NOT SHOWN ON THESE PLANS. THE FACILITIES AND IMPROVEMENTS ARE BELIEVED TO BE CORRECTLY SHOWN BUT THE CONTRACTOR IS REQUIRED TO SATISFY HIMSELF AS TO THE COMPLETENESS AND ACCURACY OF THE LOCATIONS. ANY CONTRACTOR PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE THEMSELVES WITH THE SITE AND SHALL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY, OR INDIRECTLY, FROM THEIR OPERATIONS, WHETHER OR NOT SAID FACILITIES ARE SHOWN ON THESE PLANS.

3. PROVIDE ALL CONDUITS AND WIRE NECESSARY TO ENSURE THAT ALL EXISTING SITE LIGHTING RETAINS FULL FUNCTIONALITY THROUGH ALL DEMOLITION AND NEW CONSTRUCTION. ALL EXISTING LIGHTING IS TO BE FUNCTIONAL EACH NIGHT. IF EXISTING CONDUIT OR WIRE IS DAMAGED OR DEMOLISHED, NEW OR TEMPORARY WIRING SHALL BE INSTALLED TO ENSURE THE LIGHTS ARE ON BEFORE DARK

4. ALL CONDUITS AND WIRE FOR DEMOLISHED SITE LIGHTING CIRCUITS TO BE REMOVED BACK TO SOURCE, OR FIX FIXTURE TO REMAIN COMPLETE AND NOT ABANDONED IN PLACE.

SCOPE OF WORK:

(1) APPROXIMATE LIMITS-OF-DISTRUBANCE.

(2) SAWCUT TO PROVIDE SMOOTH CLEAN EDGE.

(3) PRESERVE AND PROTECT EXISTING IMPROVEMENTS AND STRUCTURES BEYOND LIMITS OF DISTURBANCE.

(4) PROTECT IN PLACE EXISTING UTILITY.

(5) REMOVE AND PROPERLY DISPOSE OF ASPHALT CONCRETE.

(6) REMOVE AND PROPERLY DISPOSE OF CONCRETE PAVEMENT.

(7) PROTECT IN PLACE EXISTING BOLLARD.

△1 (8) REFER TO ARCHITECTURAL DRAWINGS.

(9) PROTECT IN PLACE EXISTING SCALE. CONTRACTOR TO COORDINATE WITH UNIVERSITY FACILITIES STAFF OVER SCALED ELECTRICAL COMPONENTS.

FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
O 801.521.6186 • FFKR.COM

TALISMAN
CIVIL CONSULTANTS
1588 SOUTH MAIN STREET
SUITE 200
SALT LAKE CITY, UT 84115
801.743.1300

U OF U BLDG. 303 SEISMIC UPGRADE, PROJECT # 22508 - PHASE 4
SALT LAKE CITY UTAH
-
CONSTRUCTION DOCUMENTS - 1-17-2022

REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH
1-17-22

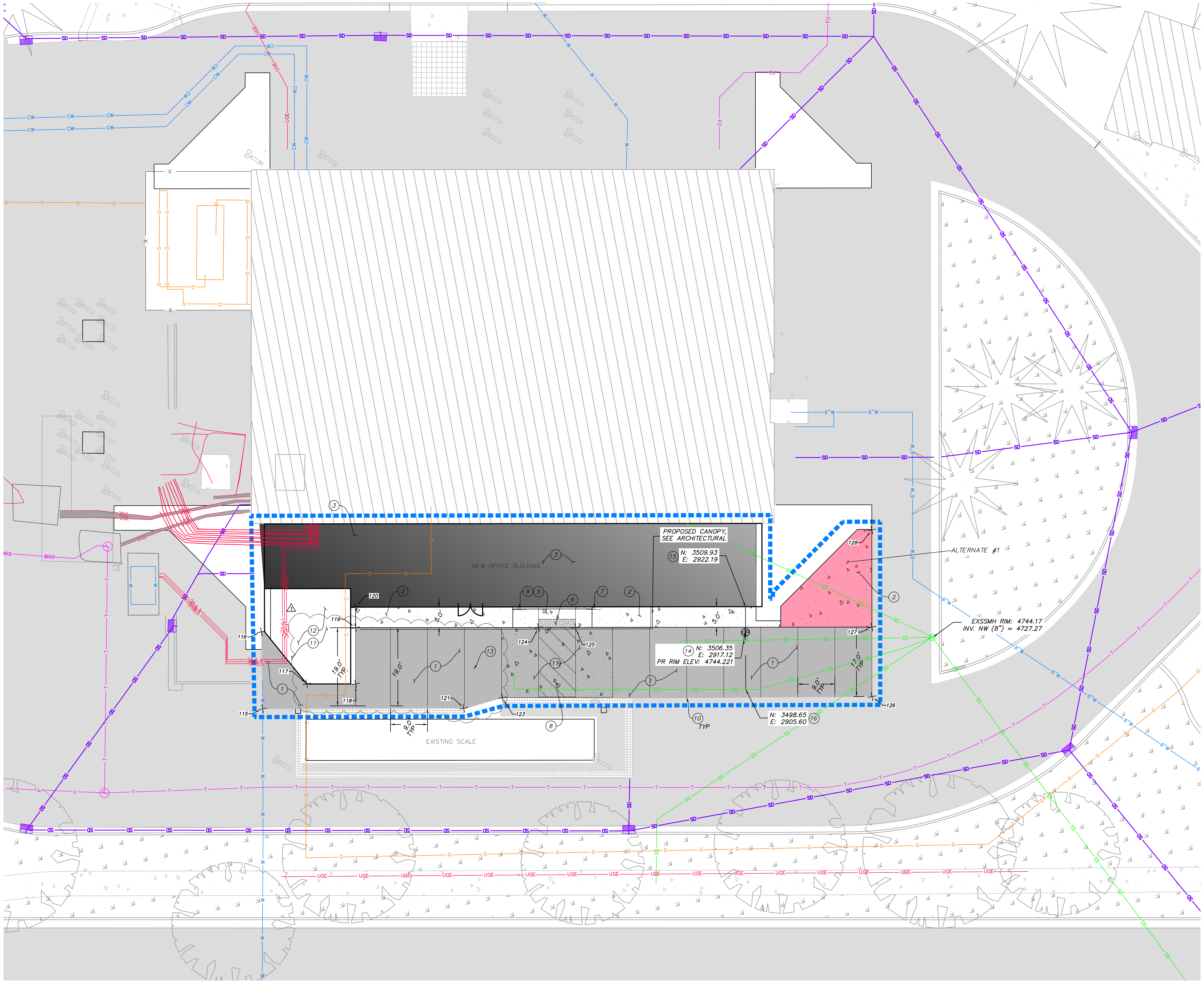
△	DATE	REVISION
1	5-17-2022	PHASE 4 ADDENDUM #1

PROJECT NUMBER 19-800.66

DEMOLITION PLAN PHASE 4

C101

05/18/2022 3:08:39 PM



SITE GENERAL NOTES:

EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED UPON RECORD INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF PLANS. LOCATIONS MAY NOT HAVE BEEN VERIFIED IN THE FIELD AND NO GUARANTEE IS MADE AS TO ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXISTENCE AND LOCATION OF THOSE UTILITIES SHOWN ON THESE PLANS OR INDICATED IN THE FIELD BY LOCATING SERVICES. ANY ADDITIONAL COSTS INCURRED AS A RESULT OF CONTRACTOR'S FAILURE TO VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION IN THEIR VICINITY SHALL BE BORNE BY THE CONTRACTOR AND ASSUMED INCLUDED IN THE CONTRACT.

LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR IS TO VERIFY CONNECTION POINTS WITH EXISTING UTILITIES. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED TO EXISTING UTILITIES AND UTILITY STRUCTURES THAT ARE TO REMAIN.

ALL SURFACE IMPROVEMENTS DISTURBED BY CONSTRUCTION SHALL BE RESTORED OR REPLACED, INCLUDING TREES, DECORATIVE SHRUBS, SOD, FENCES, WALLS AND STRUCTURES, WHETHER OR NOT THEY ARE SPECIFICALLY SHOWN ON THE CONTRACT DOCUMENTS.

SITE SCOPE OF WORK:

PROVIDE, INSTALL AND/OR CONSTRUCT THE FOLLOWING PER THE SPECIFICATIONS GIVEN OR REFERENCED, THE DETAILS NOTED, AND/OR AS SHOWN ON THE CONSTRUCTION DRAWINGS:

1. INSTALL ASPHALT PAVEMENT PER DETAIL C SHEET C700.
2. INSTALL THICKENED EDGE CONCRETE PAVEMENT PER DETAIL A SHEET C700.
3. FUTURE BUILDING. SEE ARCHITECTURAL PLANS.
4. LOADING ZONE STRIPING PER LATEST VERSION M.U.T.C.D.
5. INSTALL CURB CUT ASSEMBLY PER APWA PLAN 236.3, SHEET C700.
6. INSTALL DETECTABLE WARNING SURFACE PER APWA PLAN 238, SHEET C700.
7. INSTALL WALL MOUNTED ADA PARKING SIGN R7-8 PER LATEST VERSION M.U.T.C.D.
8. INSTALL ADA STRIPING PER LATEST VERSION OF M.U.T.C.D.
9. INSTALL WALL MOUNTED VAN ACCESSIBLE ADA PARKING SIGN R7-8b PER LATEST VERSION M.U.T.C.D.
10. 4" WIDE YELLOW PARKING PARKING STRIPE PER M.U.T.C.D.
11. INSTALL VEHICULAR CONCRETE PAVEMENT PER DETAIL B SHEET C700.
12. PROPOSED LOW PRESSURE GAS YARD. SEE ARCHITECTURAL PLANS.
13. PROPOSED SCALE HOUSE. SEE ARCHITECTURAL PLANS.
14. INSTALL SANITARY SEWER CLEANOUT PER APWA PLAN 431 SHEET C700.
15. INSTALL 4" PVC SDR-35. REFER TO MECHANICAL FOR INVERT TO BUILDING.
16. TIE INTO EXISTING 8" SANITARY SEWER LINE WITH WYE CONNECTION.

Point Table

Point #	Northing	Easting
115	3593.1049	2835.7994
116	3603.8815	2851.0999
117	3587.6308	2846.8192
118	3577.8250	2853.5054
119	3585.5080	2864.7980
120	3588.3220	2868.9310
121	3552.7528	2863.3790
123	3546.4240	2870.7870
124	3548.7539	2889.8230
125	3541.3146	2894.8882
126	3472.2739	2921.4603
127	3481.7810	2935.4232
128	3495.0712	2954.9426

SCALE
HORIZONTAL: 1" = 10

FFKR ARCHITECTS

TALISMAN CIVIL CONSULTANTS
1588 SOUTH MAIN STREET
SUITE 200
SALT LAKE CITY, UT 84115
801.743.1300

U OF U BLDG. 303 SEISMIC UPGRADE, PROJECT # 22508 - PHASE 4
SALT LAKE CITY UTAH
- CONSTRUCTION DOCUMENTS - 1-17-2022

DATE	REVISION
1 5-17-2022	PHASE 4 ADDENDUM #1

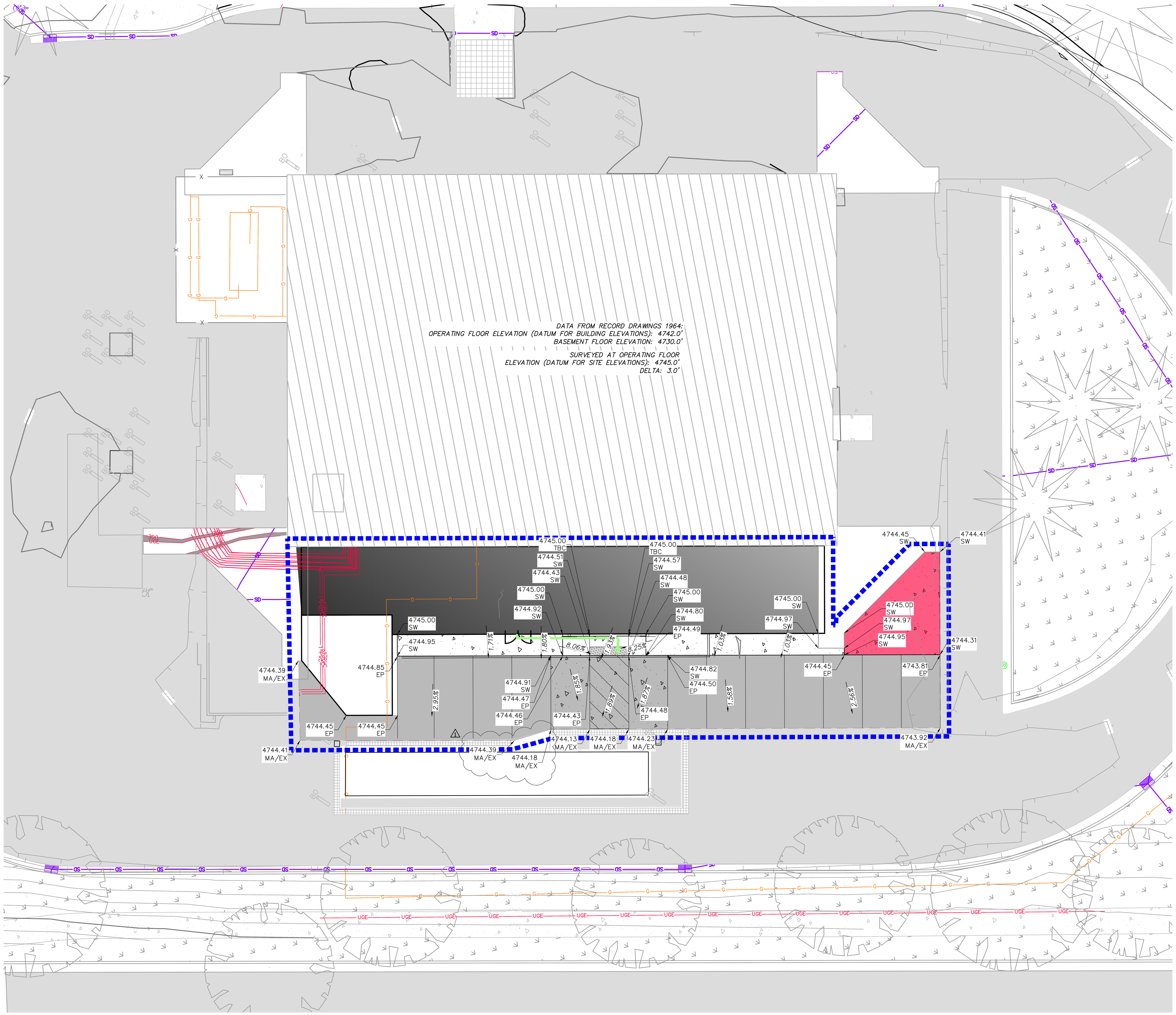
PROJECT NUMBER 19-800.66

SITE HORIZONTAL CONTROL & UTILITY PLAN PHASE 4

C201

5/23/2019 2:35:36 PM

05/18/2022 3:08:39 PM



GRADING: GEOTECHNICAL NOTES/REQUIREMENTS:

1) ALL IMPORTED MATERIAL TO BE APPROVED IN WRITING BY GEOTECHNICAL ENGINEER.

2) ALL COMPACTION FOR INTERIOR AND EXTERIOR BACKFILL ADJACENT TO BUILDINGS TO BE VERIFIED IN WRITING BY GEOTECHNICAL ENGINEER.

GRADING GENERAL NOTES:

SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS AND THE RECOMMENDATIONS SET FORTH IN THE GEOTECHNICAL REPORT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING ALL SOFT, YIELDING OR UNSUITABLE MATERIALS AND REPLACING THEM WITH SUITABLE MATERIALS AS SPECIFIED IN THE GEOTECHNICAL REPORT. ALL EXCAVATED OR FILLED AREAS SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM TEST D-1557 EXCEPT UNDER BUILDING FOUNDATIONS WHERE IT SHALL BE 95% MIN. OF MAXIMUM DENSITY. MOISTURE CONTENT AT TIME OF PLACEMENT SHALL NOT EXCEED 2% ABOVE NOR 3% BELOW OPTIMUM. CONTRACTOR SHALL SUBMIT A COMPACTION REPORT PREPARED BY A QUALIFIED REGISTERED GEOTECHNICAL ENGINEER, VERIFYING THAT ALL FILLED AREAS AND SUBGRADE AREAS WITHIN THE BUILDING PAD AREA AND AREAS TO BE PAVED HAVE BEEN COMPACTED IN ACCORDANCE WITH THESE PLANS & SPECIFICATIONS AND THE RECOMMENDATIONS SET FORTH IN THE GEOTECHNICAL REPORT.

CONTRACTOR SHALL BECOME FAMILIAR WITH EXISTING SOIL CONDITIONS.

THE CONTRACTOR IS TO USE BEST MANAGEMENT PRACTICES FOR PROVIDING EROSION CONTROL AND DUST SUPPRESSION FOR CONSTRUCTION OF THIS PROJECT. SPECIFIC INFORMATION SHOWN ON DRAWINGS C-600 SHALL BE USED IN COMBINATION WITH OTHER ACCEPTED LOCAL PRACTICES.

EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED UPON RECORD INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF PLANS. LOCATIONS MAY NOT HAVE BEEN VERIFIED IN THE FIELD AND NO GUARANTEE IS MADE AS TO ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXISTENCE AND LOCATION OF THOSE UTILITIES SHOWN ON THESE PLANS OR INDICATED IN THE FIELD BY LOCATING SERVICES. ANY ADDITIONAL COSTS INCURRED AS A RESULT OF CONTRACTOR'S FAILURE TO VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION IN THEIR VICINITY SHALL BE BORNE BY THE CONTRACTOR AND ASSUMED INCLUDED IN THE CONTRACT.

LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR IS TO VERIFY CONNECTION POINTS WITH EXISTING UTILITIES. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED TO EXISTING UTILITIES AND UTILITY STRUCTURES THAT ARE TO REMAIN.

ALL SURFACE IMPROVEMENTS DISTURBED BY CONSTRUCTION SHALL BE RESTORED OR REPLACED, INCLUDING TREES, DECORATIVE SHRUBS, SOD, FENCES, WALLS AND STRUCTURES, WHETHER OR NOT THEY ARE SPECIFICALLY SHOWN ON THE CONTRACT DOCUMENTS.

ALL CURB IS ASSUMED TO BE CATCH CURB UNLESS OTHERWISE SPECIFIED.

— — XXXX — — EXISTING ELEVATION CONTOURS

ADA ACCESSIBILITY PATH

NOTE:

NORTHING AND EASTING IS ON UNIVERSITY OF UTAH SURVEY CONTROL. CONTACT UNIVERSITY SURVEYOR TO ESTABLISH CONTROL.

ABBREVIATIONS:

MA	MATCH
EX	EXISTING
EP	EDGE OF PAVEMENT
SW	EDGE OF SIDEWALK
TBC	TOP BACK OF CURB

NOTE: MAY CONTAIN ABBREVIATIONS THAT ARE NOT USED IN THIS PLAN SET.

SCALE
HORIZONTAL: 1" = 10

FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
O 801.521.6186 • FFKR.COM

TALISMAN
CIVIL CONSULTANTS
1588 SOUTH MAIN STREET
SUITE 200
SALT LAKE CITY, UT 84115
801.743.1300

U OF U BLDG. 303 SEISMIC UPGRADE, PROJECT # 22508 - PHASE 4

SALT LAKE CITY UTAH

-

CONSTRUCTION DOCUMENTS - 1-17-2022

REGISTERED PROFESSIONAL ENGINEER
No. 10187523-2202
JEFFREY R. PALMER
1-17-22
STATE OF UTAH

△	DATE	REVISION
1	5-17-2022	PHASE 4 ADDENDUM #1

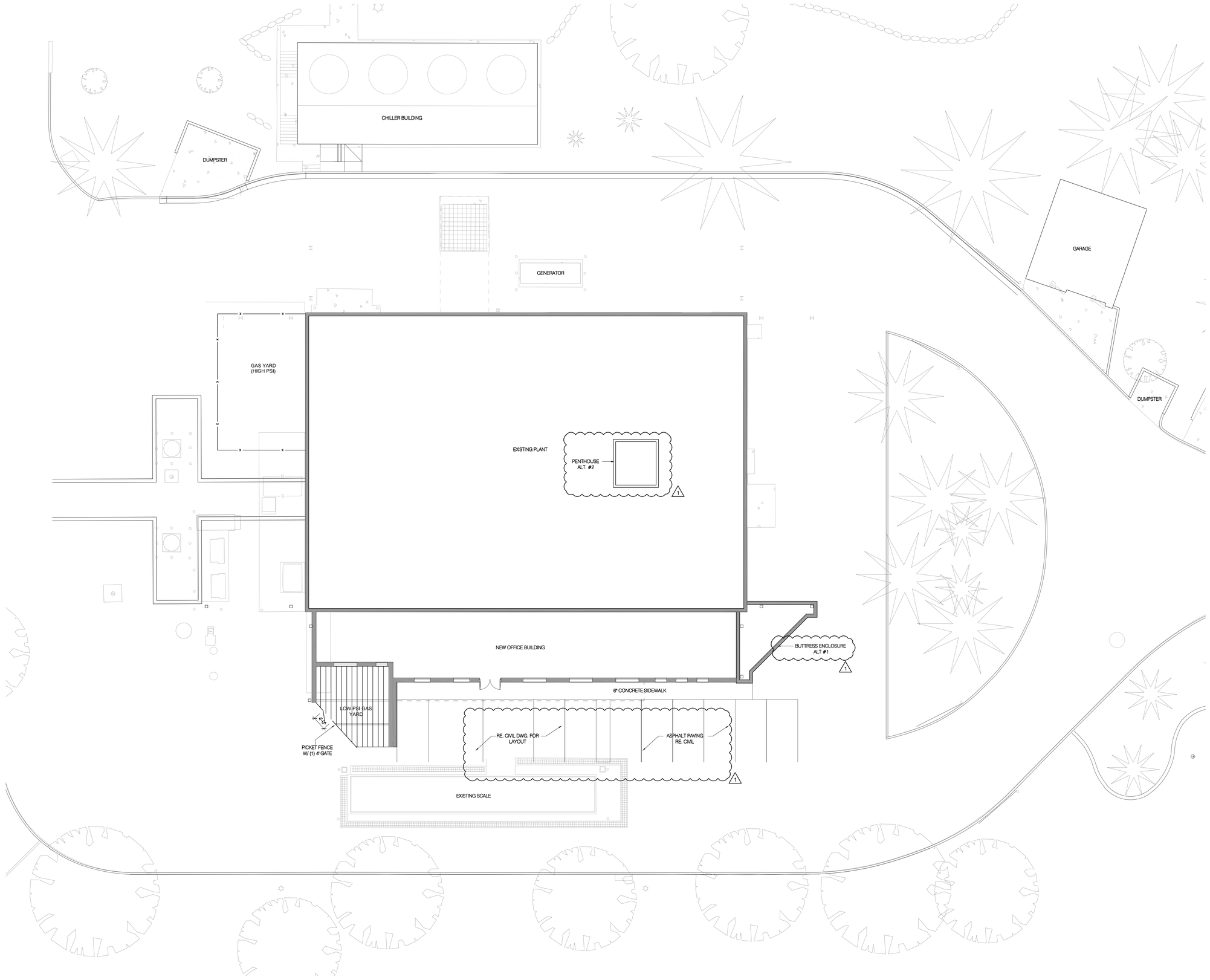
PROJECT NUMBER 19-800.66

GRADING
PLAN
PHASE 4

C401

5/23/2019 2:35:36 PM

05/18/2022 3:08:39 PM



A1 OVERALL SITE PLAN
SCALE: 3/32" = 1'-0"

SYMBOL LEGEND

EXISTING CURB, GUTTER AND ASPHALT TO BE REMOVED

EXISTING GRAVEL

FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
O 801.521.5186 • FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRAGE, PROJ. #22508 - PHASE 4
SALT LAKE CITY UTAH
-
PERMIT SET 1-4-2022

△	DATE	REVISION
1	5-17-22	Ph. 4 Add #1

PROJECT NUMBER 18136

OVERALL
SITE PLAN
PH-4

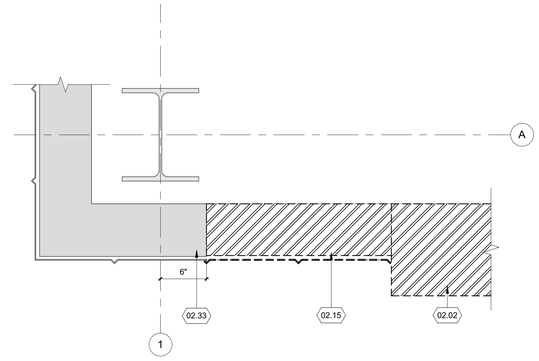
AS-101-4

REFERENCE NOTES

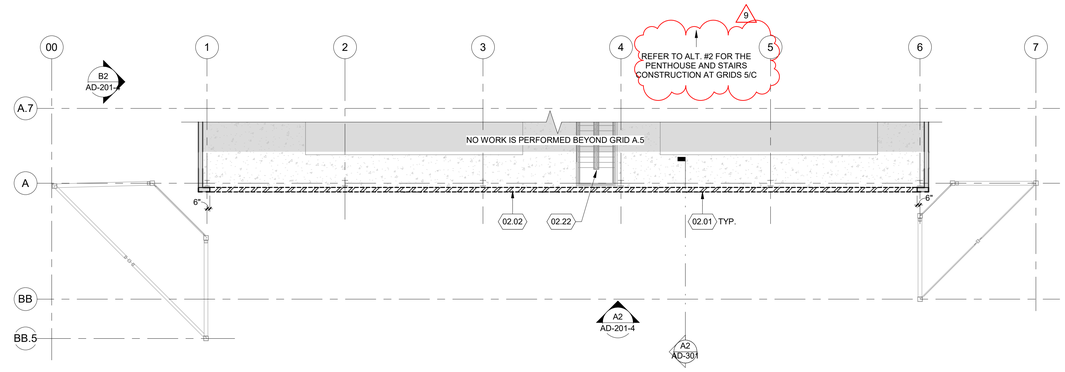
02.01 REMOVE EXISTING WINDOW
02.02 REMOVE EXISTING MASONRY WALL FROM 11'-8" A.F.F. AND UP. BRACE EXISTING MASONRY AS REQ'D
02.03 REMOVE EXISTING MASONRY WALL
02.12 REMOVE ENTIRE OFFICE BUILDING, CONCRETE SLAB, FOOTING AND FOUNDATION
02.15 REMOVE EXISTING WALL
02.22 EXISTING STAIRS TO REMAIN
02.33 EXISTING WALL TO REMAIN
02.35 EXISTING BUTTRESS FRAMEWORK FROM PREVIOUS PHASE TO REMAIN AND PROTECT
02.39 NO WORK PERFORMED IN THIS AREA
02.56 PEEL ROOFING BACK 3'-0" OR AS REQ'D, TO BE REUSED WITH NEW ROOFING OR WALL ASSEMBLY
02.72 PROTECT EXSTING GAS LINES
02.77 REMOVE EXISTING ANALOG SCALE, COORDINATE WITH SCALE CONVERSION COMPANY
02.79 REMOVE EXISTING CONCRETE/ASPHALT & FOOTING AND FOUNDATION, PREP FOR NEW CONSTRUCTION.

PHASE 4 DEMO LEGEND

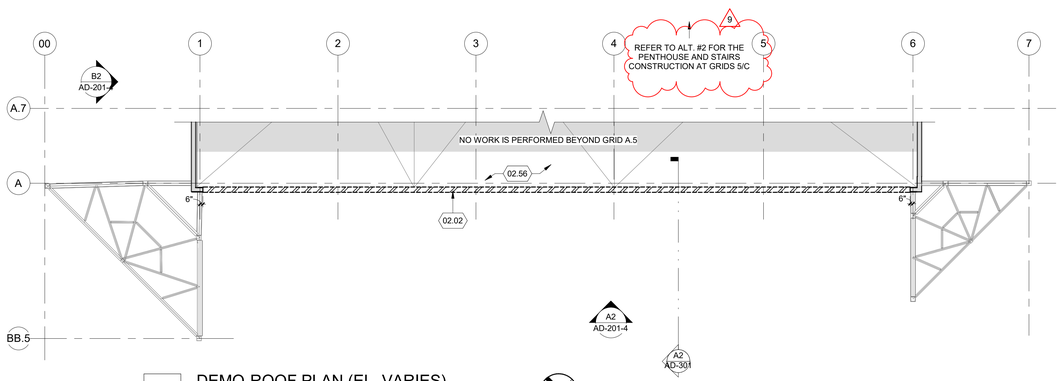
EXISTING TO BE REMOVED
CONCRETE FLOOR
FLOOR GRATE
NO WORK PERFORMED IN THIS AREA



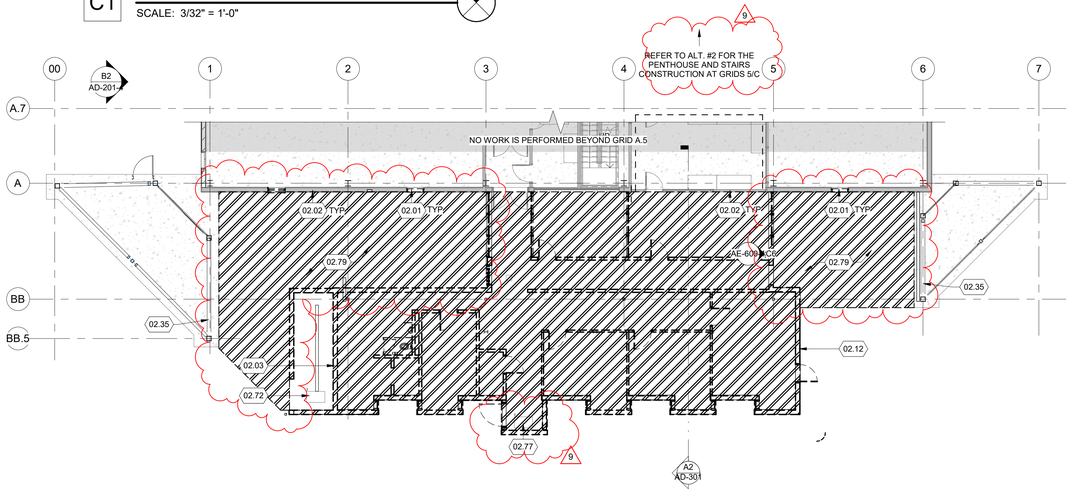
D5 BUTTRESS CORNER DEMO
SCALE: 1 1/2" = 1'-0"



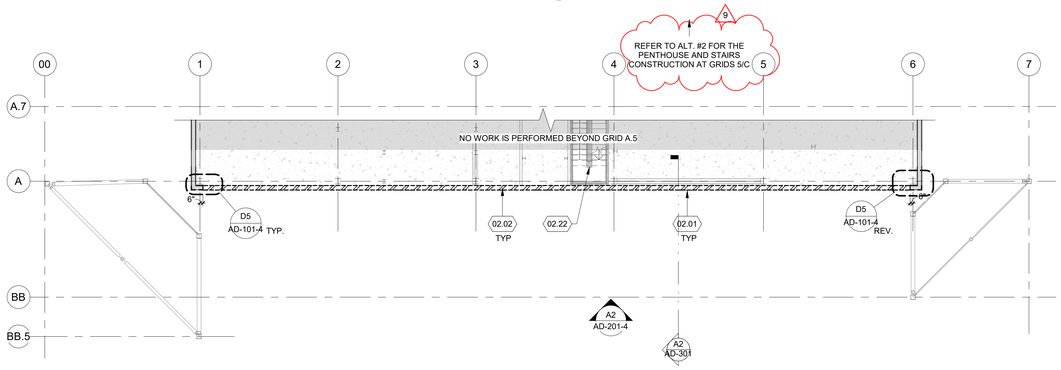
C1 DEMO-FAN FLOOR PLAN (EL. 4772'-0")
SCALE: 3/32" = 1'-0"



C4 DEMO-ROOF PLAN (EL. VARIES)
SCALE: 3/32" = 1'-0"



A1 DEMO-OPERATING FLOOR PLAN
SCALE: 3/32" = 1'-0"



A4 DEMO-PIPING FLOOR PLAN (EL. 4757'-0")
SCALE: 3/32" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · #9340047-0301 · LICENSED ARCHITECT · 5/18/22

△	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

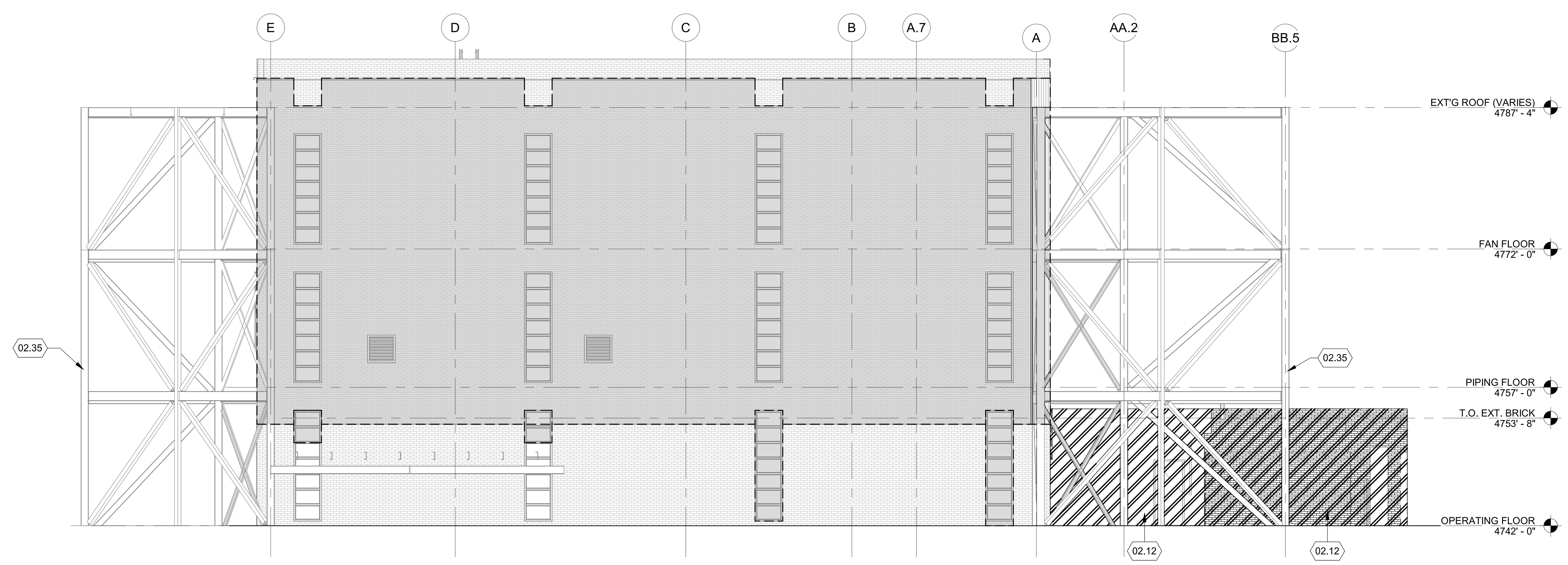
PROJECT NUMBER 18136

DEMO FLOOR & ROOF PLANS PHASE 4

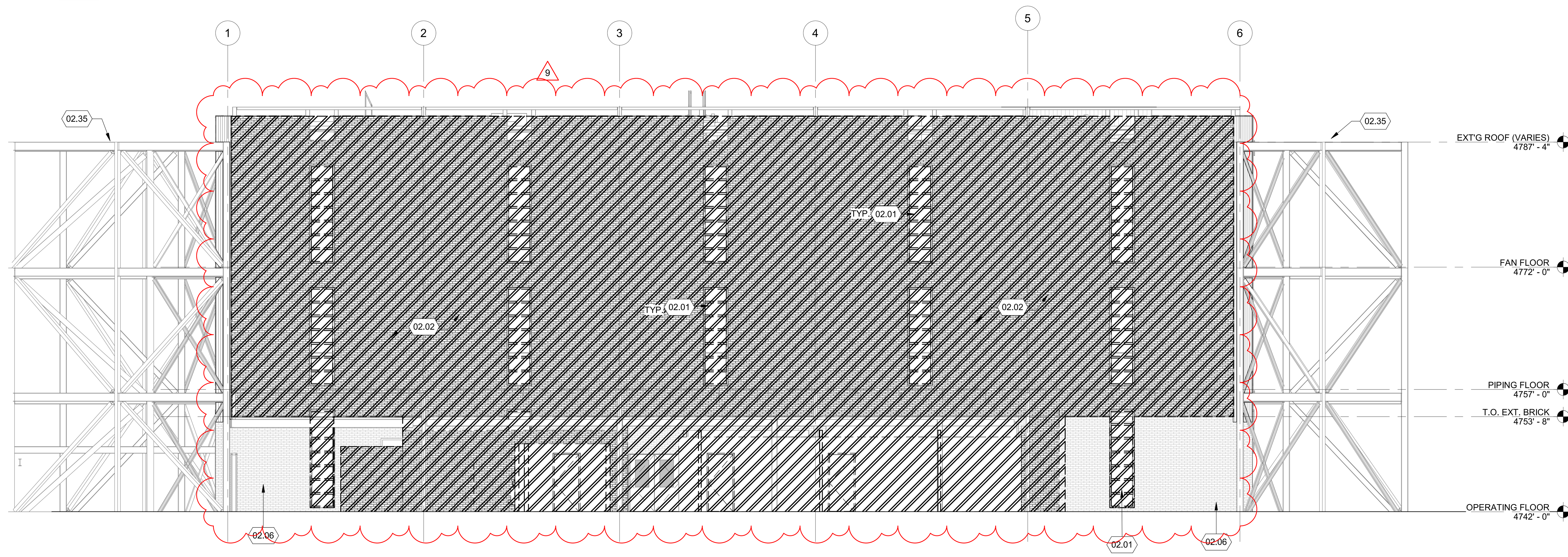
AD-101-4

REFERENCE NOTES

02.01 REMOVE EXISTING WINDOW
02.02 REMOVE EXISTING MASONRY WALL FROM 11'-8" A.F.F. AND UP, BRACE EXISTING MASONRY AS REQ'D
02.06 EXISTING MASONRY WALL TO REMAIN TO 11'-8" A.F.F.
02.12 REMOVE ENTIRE OFFICE BUILDING, CONCRETE SLAB, FOOTING AND FOUNDATION
02.35 EXISTING BUTTRESS FRAMEWORK FROM PREVIOUS PHASE TO REMAIN AND PROTECT



B2 DEMO-NORTH ELEVATION
SCALE: 1/8" = 1'-0"



A2 DEMO-WEST ELEVATION
SCALE: 1/8" = 1'-0"

PHASE 4 DEMO LEGEND

EXISTING TO BE REMOVED

MASONRY WALL

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

STATE OF UTAH LICENSED ARCHITECT JACKSON FERGUSON, AIA 8340047-0301

△	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

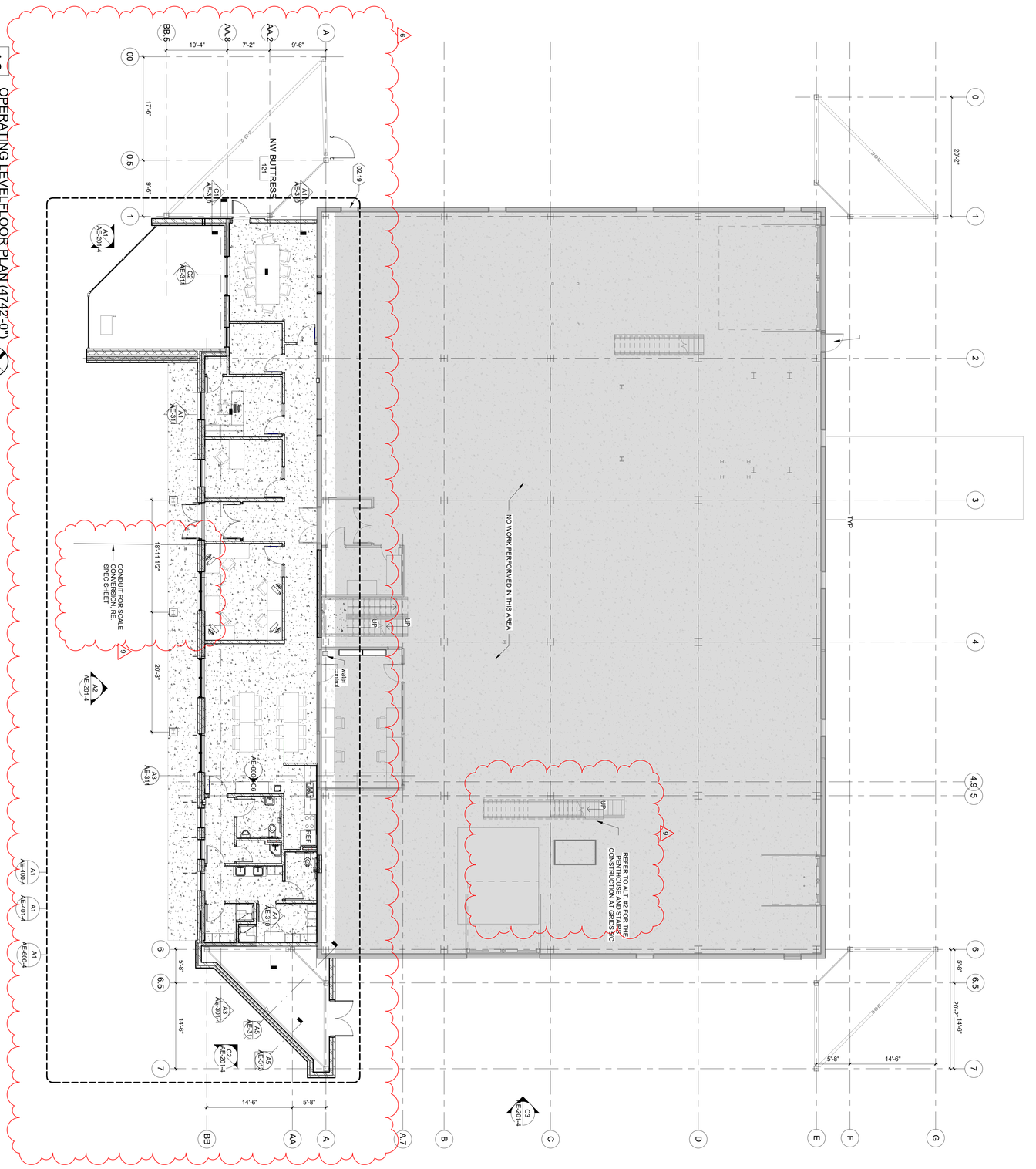
PROJECT NUMBER 18136

DEMO EXTERIOR ELEVATIONS PHASE 4

AD-201-4

A2 OPERATING LEVEL FLOOR PLAN (47'42'-0")

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



REFERENCE NOTES

02.19 EXISTING WINDOW TO REMAIN

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

△	DATE	REVISION
6	3-30-22	Phase 4 RC #1
9	5-17-22	Phi. 4 Add #1

PROJECT NUMBER 18136

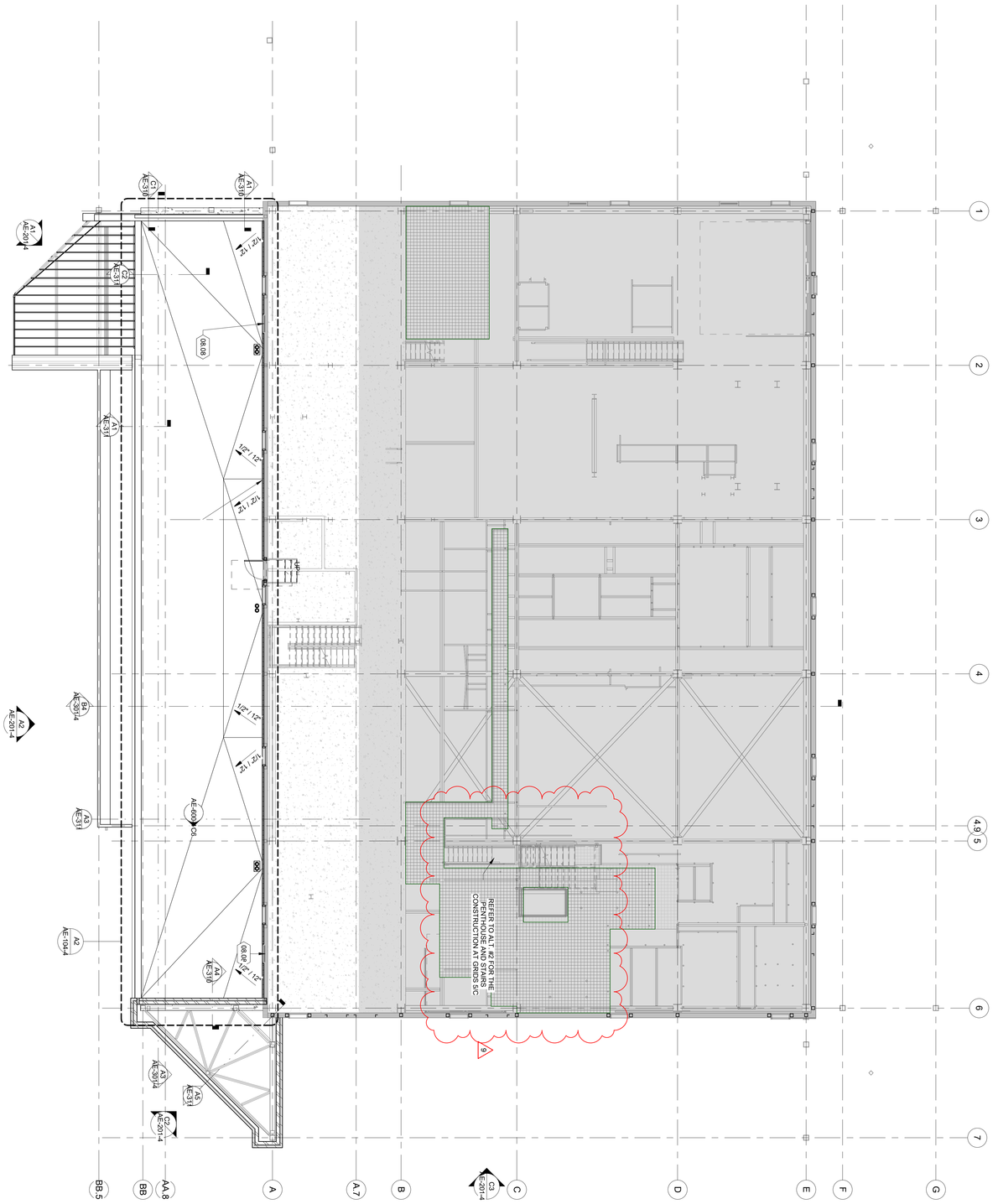
OPERATING LEVEL FLOOR PLAN PHASE 4

AE-101-4

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

5/17/2022 1:49:43 PM

05/18/2022 3:08:39 PM



A2 PIPING LEVEL FLOOR PLAN - PHASE 4

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

PHASE 4 FLOOR LEGEND

- FLOOR GRATE
- CONCRETE FLOOR

REFERENCE NOTES

08.08 MECHANICAL OPERABLE LOUVER

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

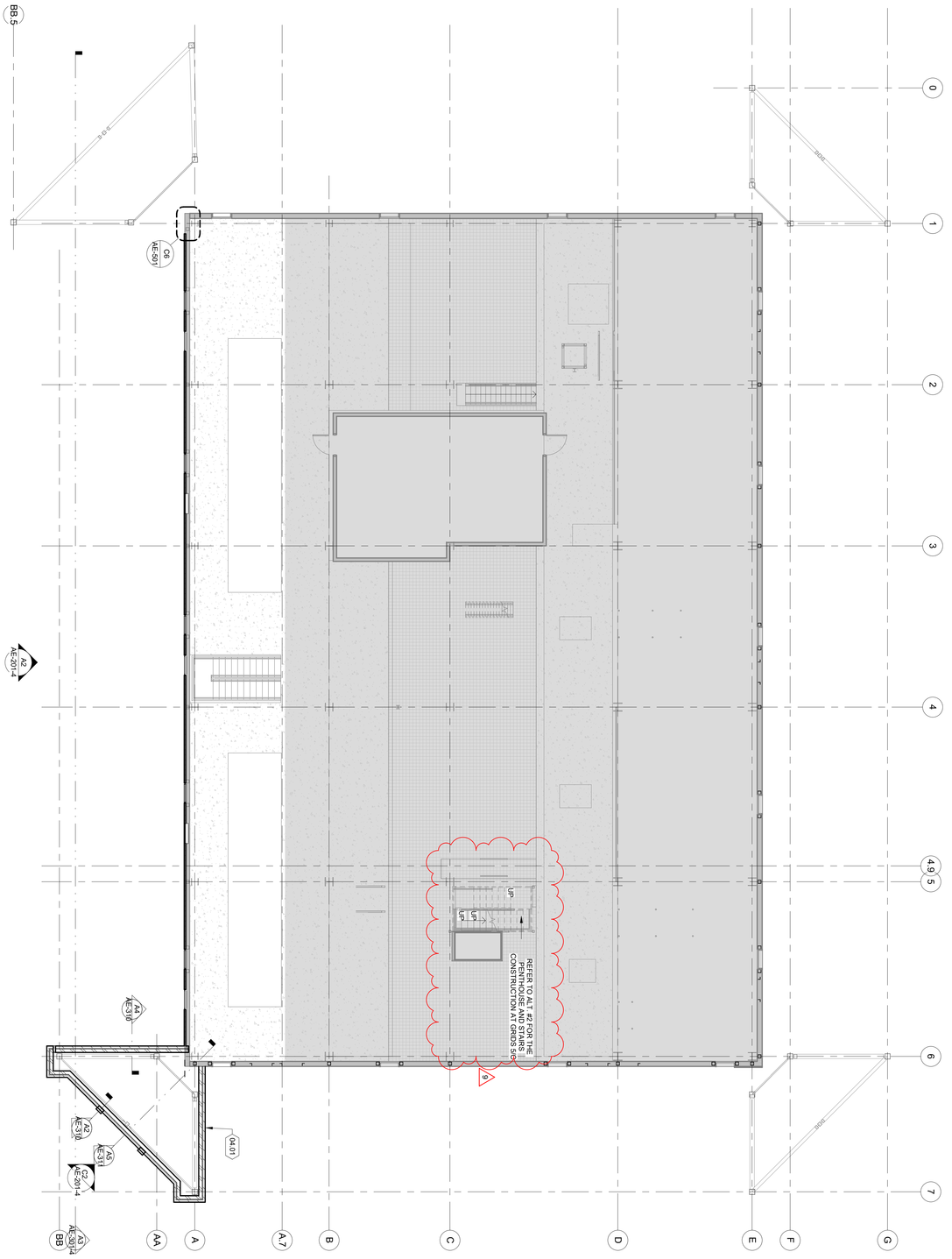
FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

PIPING LEVEL FLOOR PLAN PHASE 4

AE-102-4

PROJECT NUMBER 18136

	DATE	REVISION
9	5-17-22	PH. 4 ADD #1



A2 FAN LEVEL FLOOR PLAN (EL. 4772'-0")

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

PHASE 4 FLOOR LEGEND

- FLOOR GRATE
- CONCRETE FLOOR

REFERENCE NOTES

04.01 STANDARD BRICK - 3/8" JOINT

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

PROJECT NUMBER 18136

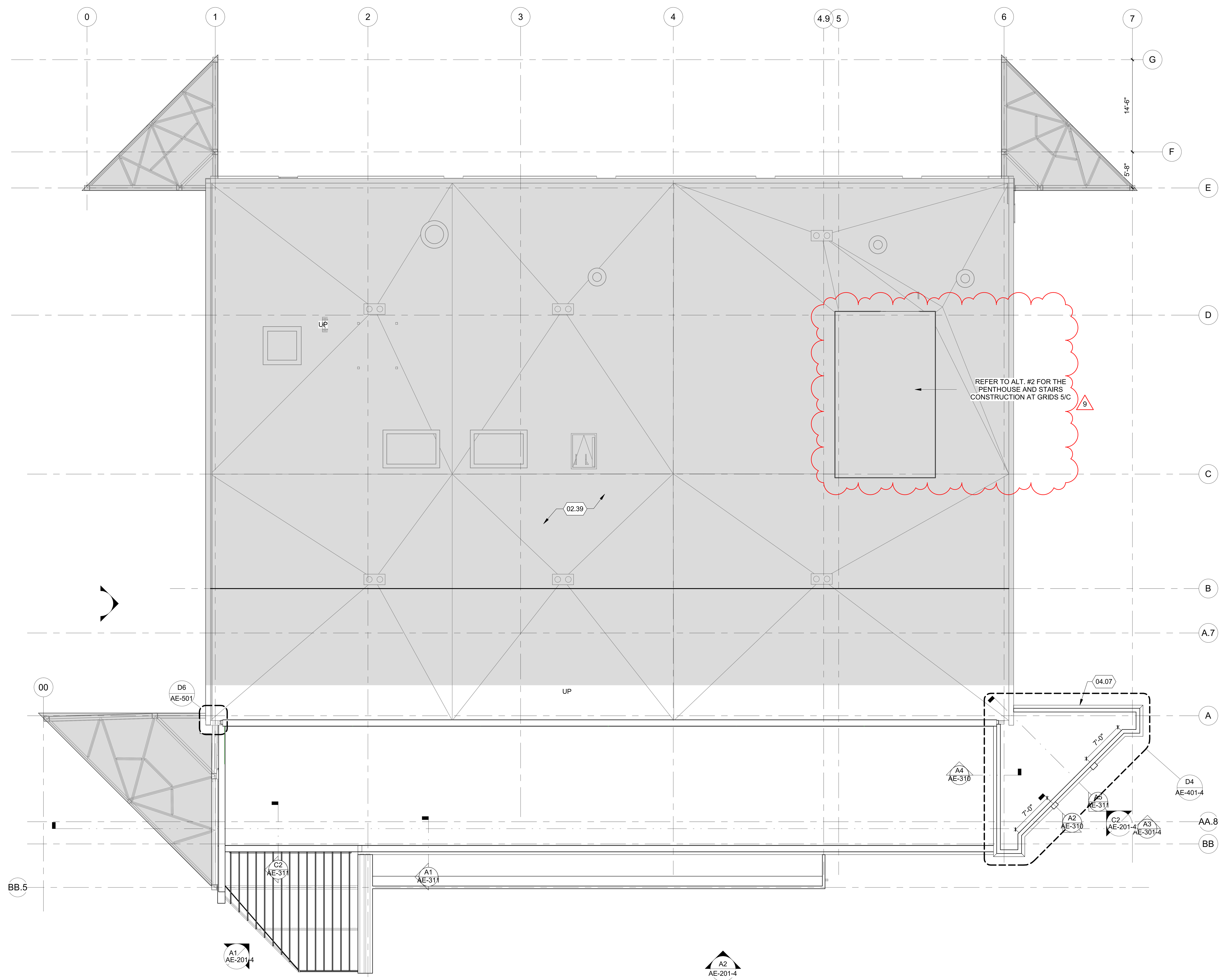
FAN LEVEL FLOOR PLAN PHASE 4

AE-103-4

05/18/2022 3:08:40 PM

REFERENCE NOTES

02.39 NO WORK PERFORMED IN THIS AREA
04.07 NEW WALL. SEE PARTITION TYPES



A2 ROOF PLAN (EL. VARIES) - PHASE 4
SCALE: 1/8" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue - Salt Lake City, Utah 84104
O 801.521.6186 - FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

STATE OF UTAH
JACKSON FERGUSON, AIA
#334047-0301
LICENSED ARCHITECT
1/18/22

△	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

PROJECT NUMBER 18136

ROOF PLAN PHASE 4

AE-104-4

5/17/2022 1:49:45 PM

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

△	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

PROJECT NUMBER 18136

OPERATING LEVEL RCP PHASE 4

AE-111-4

REFERENCE NOTES

02.39 NO WORK PERFORMED IN THIS AREA

CEILING LEGEND

ROOM NAME
RM NO.
HT | C
PNT

HEIGHT ABOVE FINISHED FLOOR
C = CEILING TYPE
PNT = CEILING FINISH

GYPSUM CEILING

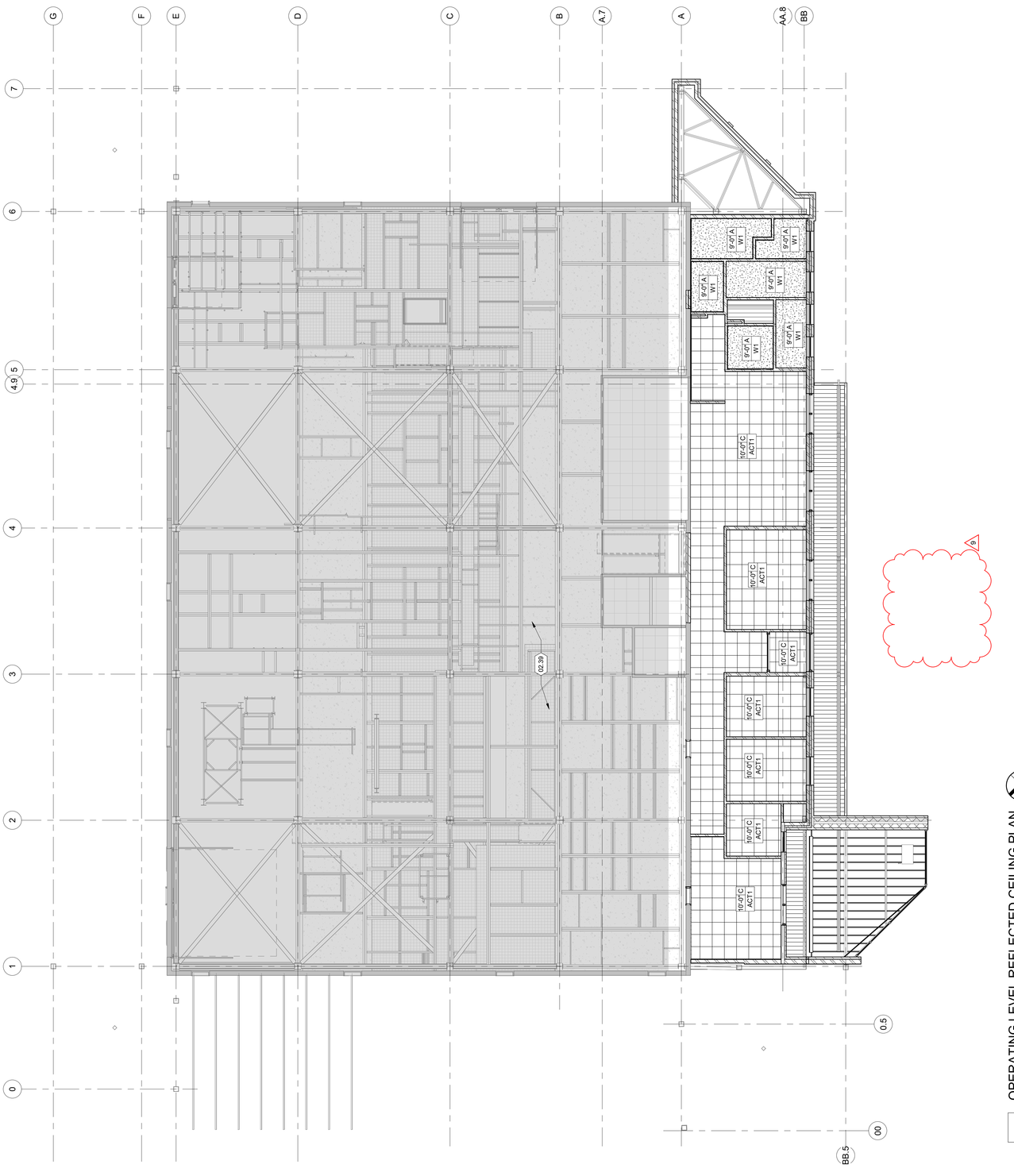
2' X 2' ACOUSTICAL CEILING PANEL

LIGHT FIXTURES

MECHANICAL FIXTURES

FIRE SPRINKLERS +

CEILING TYPE
- A GYPSUM BOARD - SUSPENDED
- B GYPSUM BOARD - FRAMED
- C 2' X 2' ACOUSTICAL CEILING PANEL
- D OPEN TO STRUCTURE



OPERATING LEVEL REFLECTED CEILING PLAN

A2

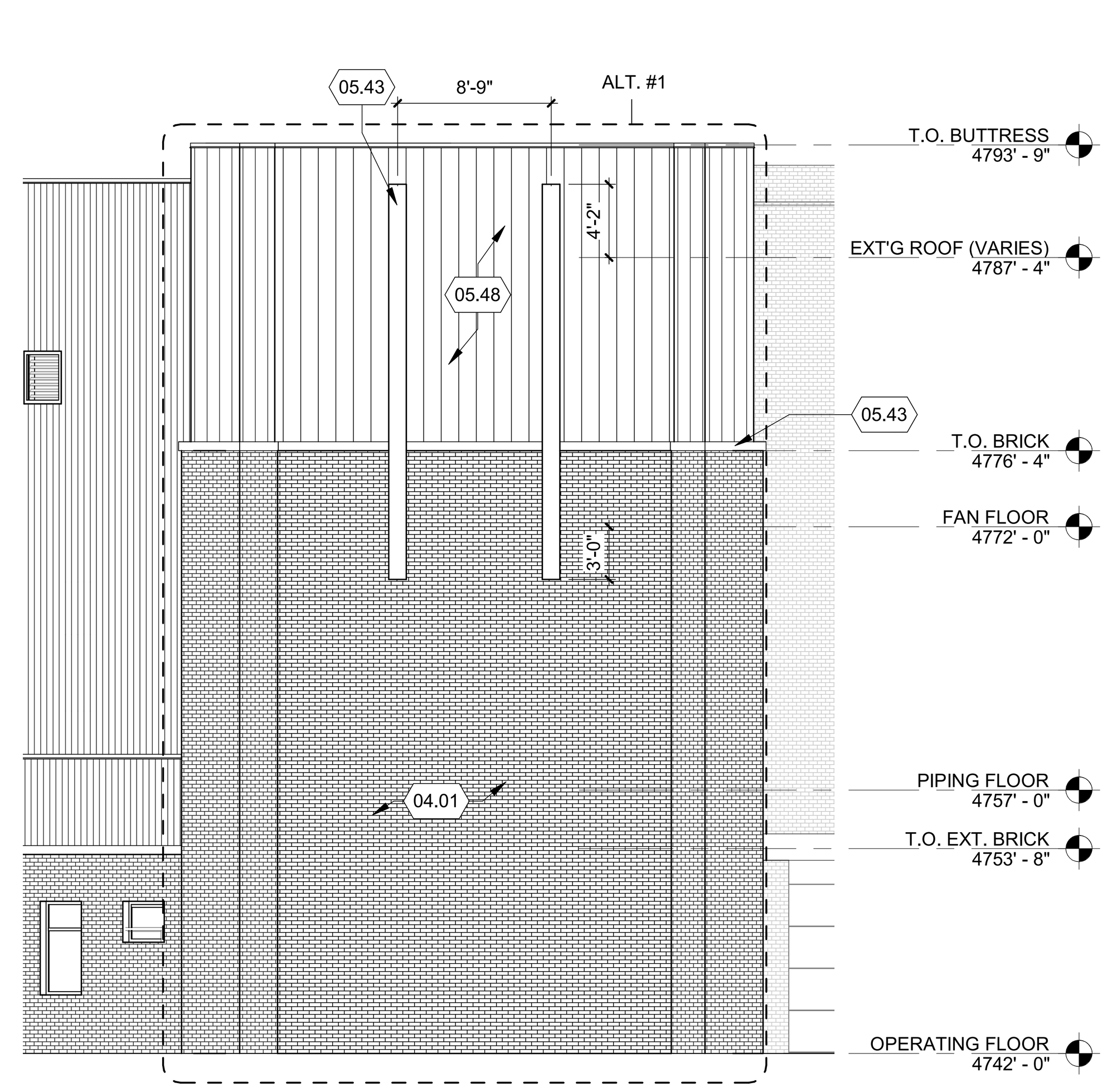
SCALE: 1/8" = 1'-0"

05/18/2022 3:08:40 PM

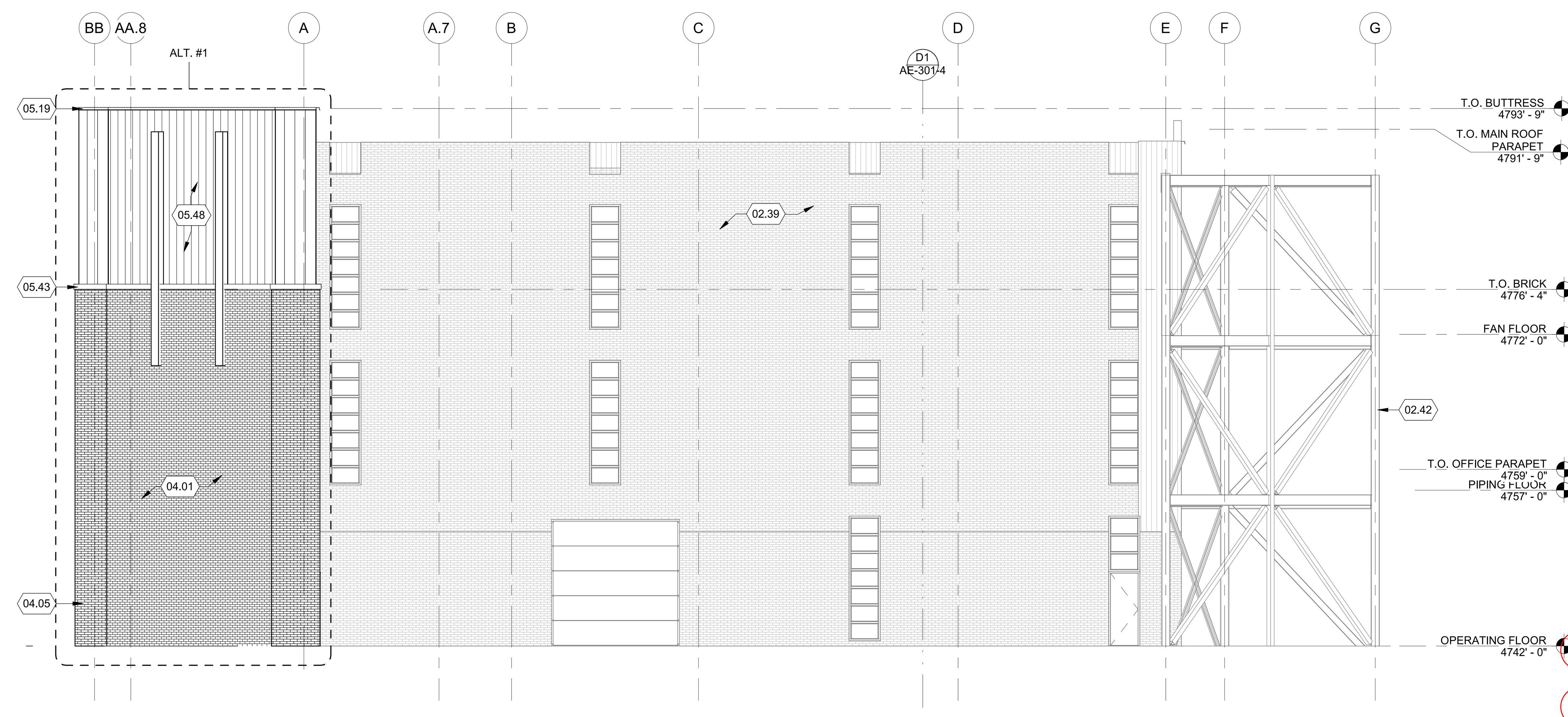
5/17/2022 1:49:46 PM

REFERENCE NOTES

02.39	NO WORK PERFORMED IN THIS AREA
02.42	PROTECT EXPOSED STRUCTURE
04.01	STANDARD BRICK - 3/8" JOINT
04.05	NEW BRICK WALL. SEE PARTITION TYPES
05.02	STRUCTURAL BEAM, PRIMED; PAINTED IF EXPOSED
05.18	3" INSULATED METAL PANEL (R25) TO SPAN VERTICALLY, ATTACH TO STEEL FRAME OR METAL STUDS, ALSO RE. STRU. DWG.
05.19	PREPAINTED METAL CAP
05.43	POWDER COATED ALUMINUM TRIM
05.48	24 GAUGE PREPAINTED METAL PANEL WITH CONCEALED FASTENER, CAULKING AND CLOSURE ANGLE AT ALL EDGES AS REQ'D
05.53	1 1/2" DIA. METAL PIPE 18" O.C. WELDED TO STRUCTURAL W BEAMS, HOT DIPPED GALVANIZED, PAINTED
05.55	METAL FENCING: 1" PIPES SPACED AT 6" O.C. WITH 1 1/2" X 1/4" PLATES @ TOP AND BOTTOM AND 3 INTERMEDIATES; A 4' WIDE FULL HEIGHT SWING GATE WITH DEAD BOLT, KEYED BOTH SIDES; 3" X 3" STEEL POST AT CORNERS ARE REQ'D (TYP.) HOT DIP GALVANIZED, PAINTED, ANCHORED TO STRUCTURE ABOVE
08.01	ALUMINUM STOREFRONT SYSTEM
08.03	DOOR. RE DOOR SCHEDULE
08.05	WINDOW, RE WINDOW SCHEDULE
08.08	MECHANICAL OPERABLE LOUVER



C2 BUTTRESS ELEVATION
SCALE: 1/8" = 1'-0"



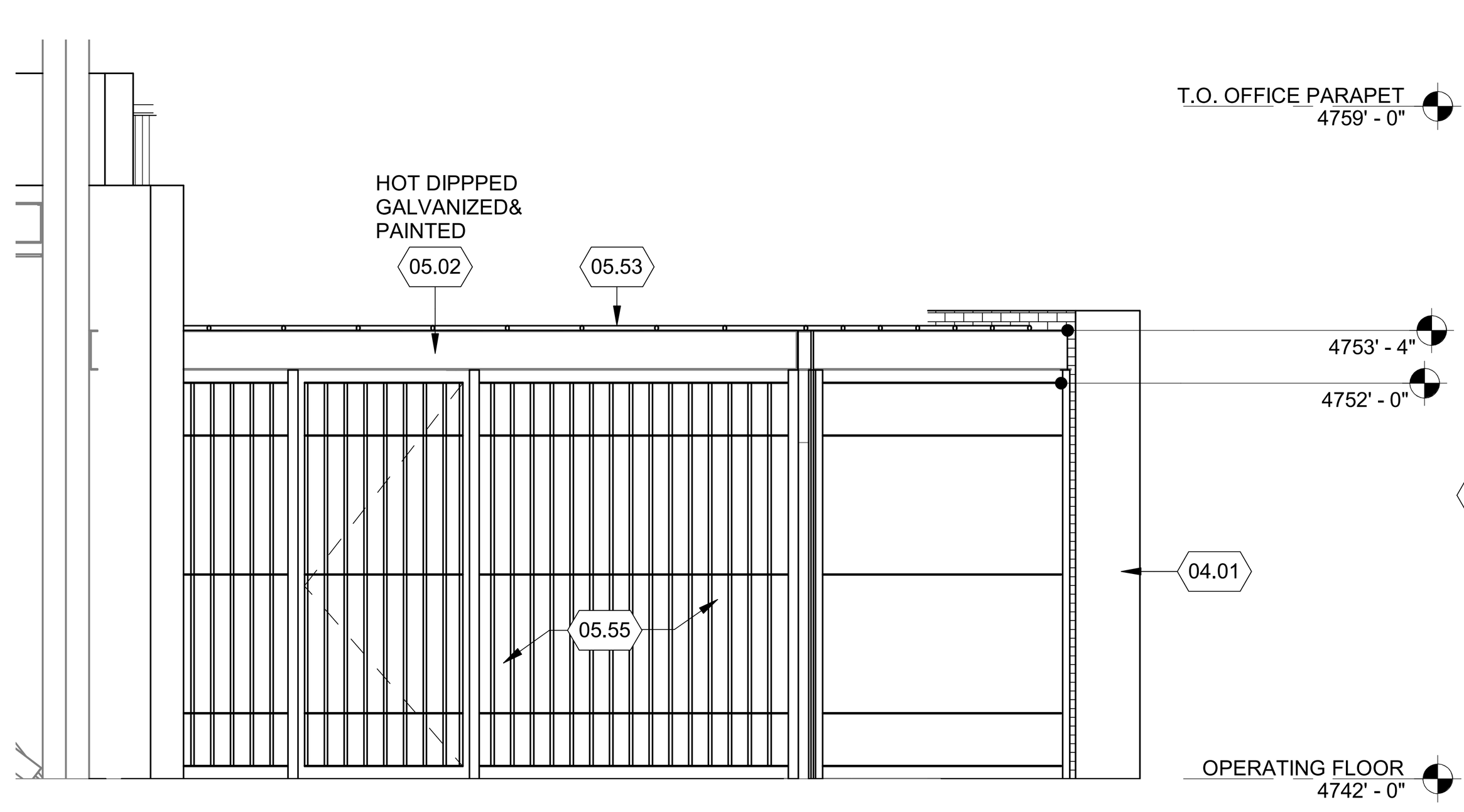
C3 SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

GLAZING SCHEDULE

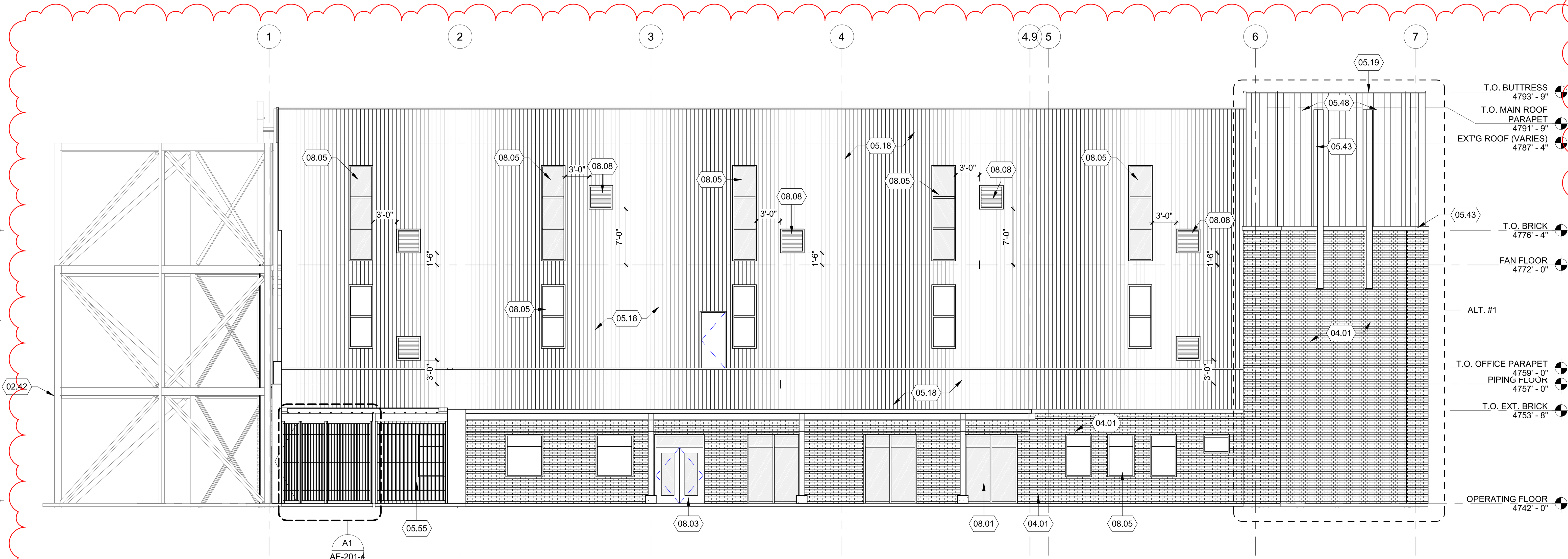
G-1 ← GLAZING TYPE

G-1	FLOAT GLASS
G-1T	FLOAT GLASS - TEMPERED
G-2	INSULATED GLASS U-VALUE 0.22, SHGC 0.39
G-2T	INSULATED GLASS - TEMPERED U-VALUE 0.22, SHGC 0.39
G-3	LAMINATED SOUND GLASS
G-3T	LAMINATED SOUND GLASS - TEMPERED

ALL INSULATED GLASS TO BE SOLARBAN 60 W/ A U-FACTOR OF 0.22 AND SHGC 0.39 OR BETTER



A1 GAS YARD FENCE
SCALE: 1/4" = 1'-0"



A2 WEST ELEVATION
SCALE: 1/8" = 1'-0"

GLAZING CALCULATION:
PLANT (WEST WALL): 270 SF / 4,000 SF = 6.7%
OFFICE BUILDING: 410 SF / (2,050 + 300 + 300) SF = 15.4%

PHASE 4 NOTES

ALTERNATE #1
- SOUTHWEST BUTTRESS ENCLOSURE TO BE AN ADD ALTERNATE.
- BASE BID TO INCLUDE ALL ELEMENTS NORTH OF GRID 6 AND BELOW EL. 4760'-0.
- APPLY DETAILS D5/AE-506 & B5/AE-501 (WHERE APPLIES) IF THE ALTERNATE IS NOT ACCEPTED.

1. NO FURRING NOR TILE BEHIND THE LOWER MILLWORK AT THE EXISTING WALL @ WARMING KITCHEN.
2. NOT ALL SECTIONS NOR DETAILS ARE APPLIED TO THIS PHASE, CERTAIN INFORMATION WERE ISSUED PREVIOUSLY

DATUM NOTES

1. THE ELEVATION MARKERS ON THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS ARE 3'-0" LOWER THAN THE SURVEY (UNIVERSITY BENCHMARK). DO NOT USE THESE MARKERS OUTSIDE OF THE BUILDING ENVELOPE.
2. THE CIVIL DRAWINGS ARE INLINE WITH THE CURRENT UNIVERSITY BENCHMARK.

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

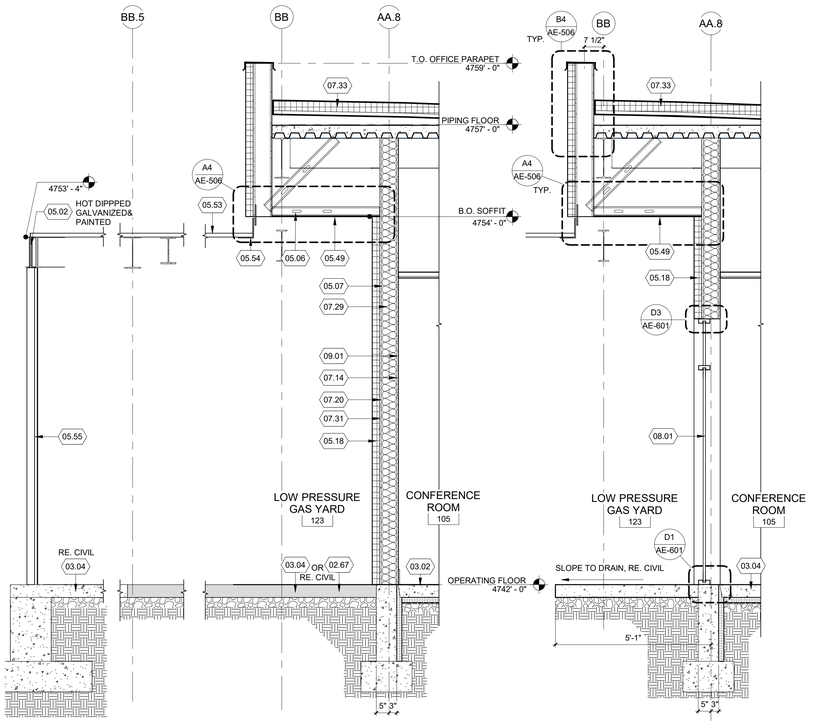
U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

△	DATE	REVISION
6	3-30-22	Phase 4 RC #1
8	4-15-22	Phase 4 RC #2

PROJECT NUMBER 18136

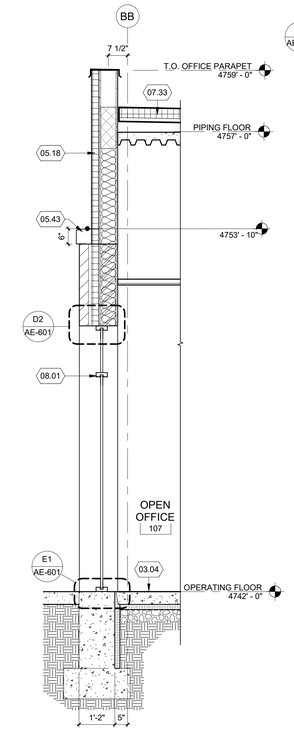
EXTERIOR ELEVATIONS PHASE 4

AE-201-4

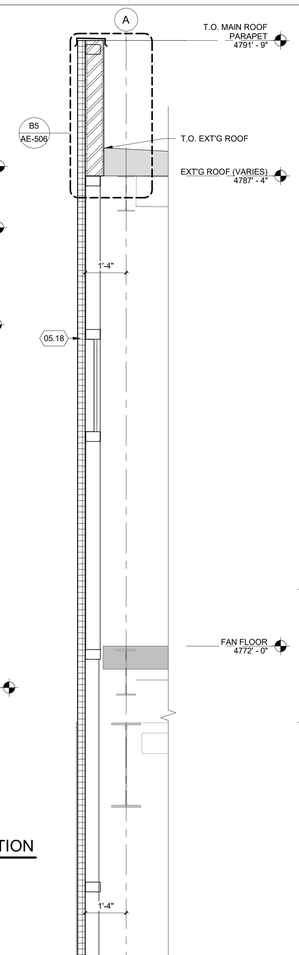


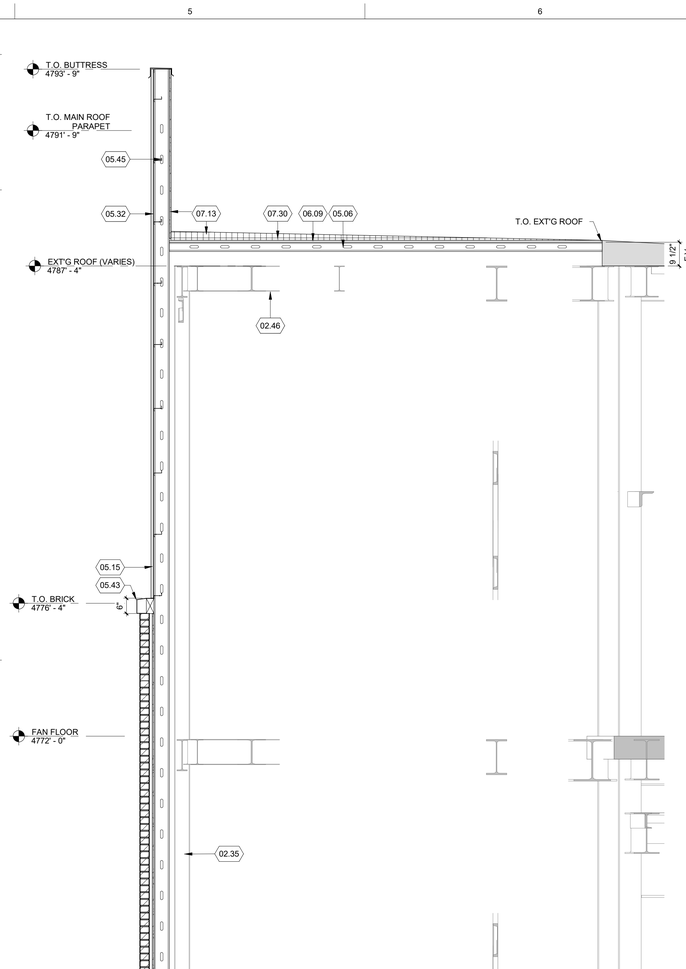
C1 OFFICE BLDG. WALL SECTION
SCALE: 1/2" = 1'-0"

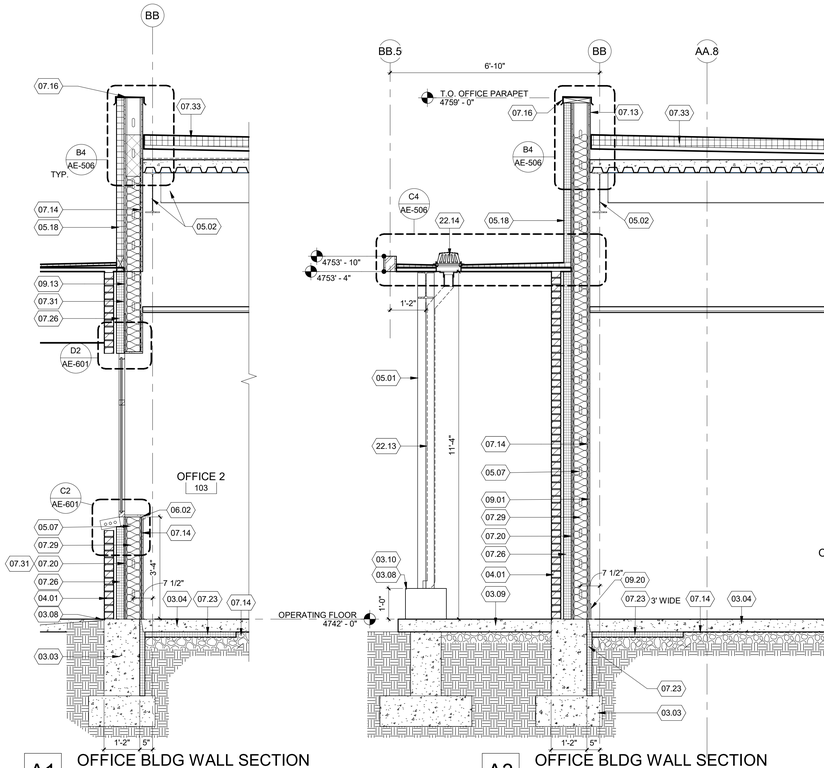
C2 OFFICE BLDG WALL SECTION
SCALE: 1/2" = 1'-0"



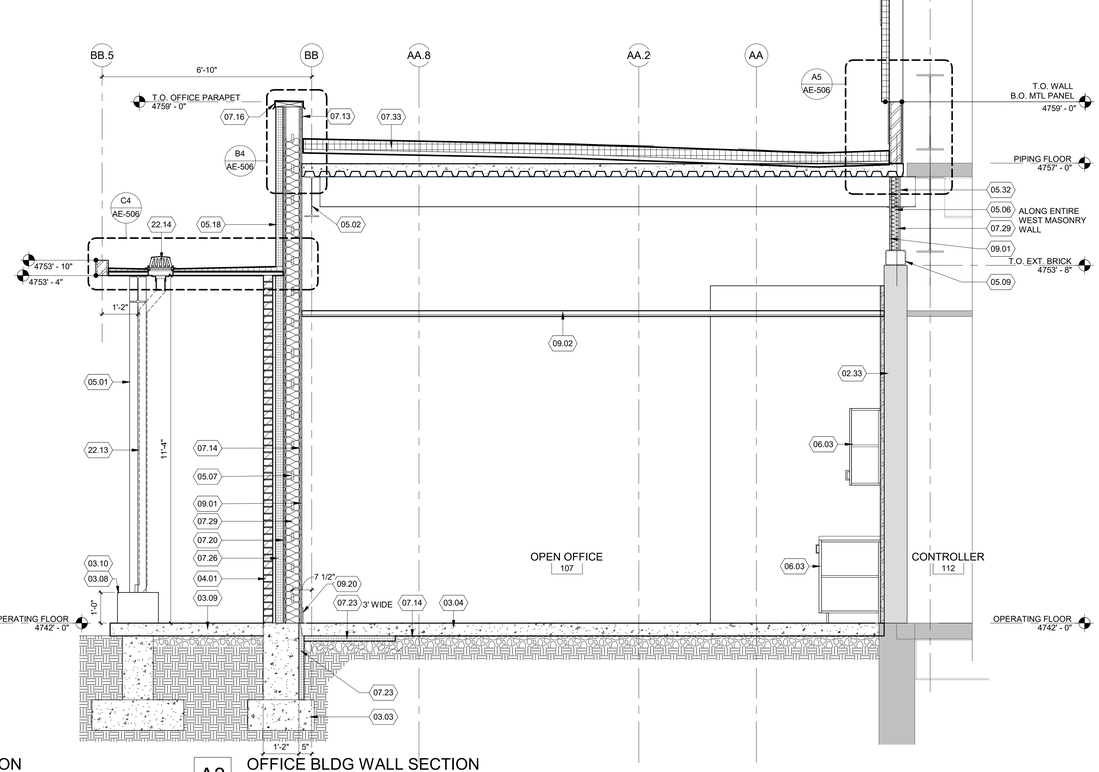
C3 OFFICE BLDG. WALL SECTION
SCALE: 1/2" = 1'-0"



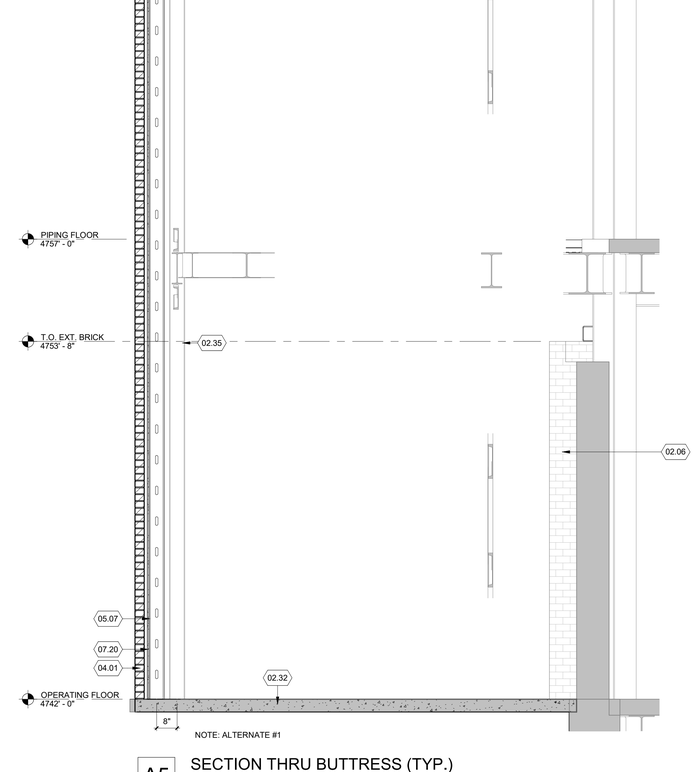




A1 OFFICE BLDG WALL SECTION
SCALE: 1/2" = 1'-0"



A3 OFFICE BLDG WALL SECTION
SCALE: 1/2" = 1'-0"



A5 SECTION THRU BUTTRESS (TYP.)
SCALE: 1/2" = 1'-0"

REFERENCE NOTES

02.06	EXISTING MASONRY WALL TO REMAIN TO 11'-8" A.F.F.
02.32	EXISTING FLOOR OR CONCRETE SLAB TO REMAIN
02.33	EXISTING WALL TO REMAIN
02.35	EXISTING BUTTRESS FRAMEWORK FROM PREVIOUS PHASE TO REMAIN AND PROTECT
02.46	EXISTING STRUCTURE TO REMAIN
02.67	EXISTING CONCRETE FLOOR
03.02	CONCRETE FLOOR, RE. FINISH SCHEDULE
03.03	CONCRETE FOOTING AND FOUNDATION
03.04	CONCRETE SLAB ON GRADE
03.08	1/2" CHAMFER, OMIT IF IT'S
03.09	CONCRETE SIDEWALK, RE. CIVIL DWG.
03.10	16" X 16" CONCRETE PIER, RE. STRU. DWG.
04.01	STANDARD BRICK - 3/8" JOINT
05.01	STRUCTURAL COLUMN, PRIMED; PAINTED IF EXPOSED
05.02	STRUCTURAL BEAM, PRIMED; PAINTED IF EXPOSED
05.06	3 5/8" METAL STUD
05.07	6" METAL STUD
05.09	STEEL TUBE, PRIMED & PAINTED
05.15	EXTERIOR METAL PANEL
05.18	3" INSULATED METAL PANEL (R25) TO SPAN VERTICALLY, ATTACH TO STEEL FRAME OR METAL STUDS. ALSO RE. STRU. DWG.
05.32	24 GAUGE PREPAINTED METAL PANEL (COLOR TO MATCH EXISTING) WITH EXPOSED FASTENER, CAULKING AND CLOSURE ANGLE AT ALL EDGES
05.43	POWDER COATED ALUMINUM TRIM
05.45	GALVANIZED Z GIRT; SIZE, GA. AND SPACING AS PER METAL PANEL MANUFACTURER'S REQUIREMENT
05.49	ALUMINUM SOFFIT W/ COLOR MATCHING CLOSURE TRIM & FLASHING
05.53	1 1/2" DIA. METAL PIPE 18" O.C. WELDED TO STRUCTURAL W BEAMS, HOT DIPPED GALVANIZED, PAINTED
05.54	STEEL ANGLE, HOT DIPPED GALVANIZED, PAINTED, BOLTED TO A STEEL EMBED, MAINTAIN A 1/2" EXPANSION GAP
05.55	METAL FENCING: 1" PIPES SPACED AT 6" O.C. WITH 1 1/2" X 1/4" PLATES @ TOP AND BOTTOM AND 3 INTERMEDIATES; A 4' WIDE FULL HEIGHT SWING GATE WITH DEAD BOLT, KEYED BOTH SIDES; 3" X 3" STEEL POST AT CORNERS ARE REQ'D (TYP.) HOT DIP GALVANIZED, PAINTED, ANCHORED TO STRUCTURE ABOVE
06.02	SOLID SURFACE COUNTERTOP
06.03	MILLWORK CABINETS, RE. INTERIOR FINISHES
06.09	3/4" PLYWOOD
07.13	SINGLE PLY ROOFING, MIN. 6" OVERLAP AT JOINTS
07.14	VAPOR RETARDER, TO SPAN CONTINUOUSLY BELOW NEW CONCRETE SLAB ON GRADE, ABOVE METAL ROOF DECK, AND ON THE INSIDE OF METAL STUD WALL, TAPE AT ALL EXPOSED JOINTS
07.16	PREPAINTED METAL PARAPET CAP
07.20	1/2" EXTERIOR GLASS MAT SHEATHING
07.23	2" RIGID INSULATION, MIN. R12
07.26	3" RIGID INSULATION, MIN. R18
07.29	BATT INSULATION, MIN. R3 PER 1 INCH
07.30	RIGID ROOF INSULATION, 1/4" PER FOOT SLOPE
07.31	FLUID APPLIED AIR BARRIER
07.33	ROOF ASSEMBLY, RE. TYP. ROOF DETAIL E4/AE-506
08.01	ALUMINUM STOREFRONT SYSTEM
09.01	5/8" TYPE 'X' GYPSUM BOARD, PAINT
09.02	SCHEDULED CEILING, RE. REFLECTIVE CEILING PLAN
09.13	5/8" EXTERIOR GYPSUM SHEATHING
09.20	SCHEDULED BASE
22.13	ROOF DRAIN DOWN SPROUT WITH HEAT TRACE
22.14	SINGLE ROOF DRAIN

BUILDING ENVELOPE NOTES

1. VAPOR RETARDER, TO SPAN CONTINUOUSLY BELOW NEW CONCRETE SLAB ON GRADE, ABOVE METAL ROOF DECK, AND ON THE INSIDE OF METAL STUD WALL, TAPE AT ALL EXPOSED JOINTS.
2. FLUID APPLIED AIR BARRIER TO BE APPLIED ON ALL SOLID VERTICAL WALL SUBSTRATES.
3. VAPOR BARRIER TO BE APPLIED ON WALLS WHERE THERE IS NOT A SOLID SUBSTRATE; CONTINUOUS, TAPE AT ALL JOINTS.

PHASE 4 NOTES

ALTERNATE #1
- SOUTHWEST BUTTRESS ENCLOSURE TO BE AN ADD ALTERNATE.
- BASE BID TO INCLUDE ALL ELEMENTS NORTH OF GRID 6 AND BELOW EL. 4760'-0.
- APPLY DETAILS D5/AE-506 & B5/AE-501 (WHERE APPLIES) IF THE ALTERNATE IS NOT ACCEPTED.

1. NO FURRING NOR TILE BEHIND THE LOWER MILLWORK AT THE EXISTING WALL @ WARMING KITCHEN.
2. NOT ALL SECTIONS NOR DETAILS ARE APPLIED TO THIS PHASE, CERTAIN INFORMATION WERE ISSUED PREVIOUSLY

DATUM NOTES

1. THE ELEVATION MARKERS ON THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS ARE 3'-0" LOWER THAN THE SURVEY (UNIVERSITY BENCHMARK). DO NOT USE THESE MARKERS OUTSIDE OF THE BUILDING ENVELOPE.
2. THE CIVIL DRAWINGS ARE INLINE WITH THE CURRENT UNIVERSITY BENCHMARK.

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · #9340847-0301 · LICENSED ARCHITECT · 7/18/22

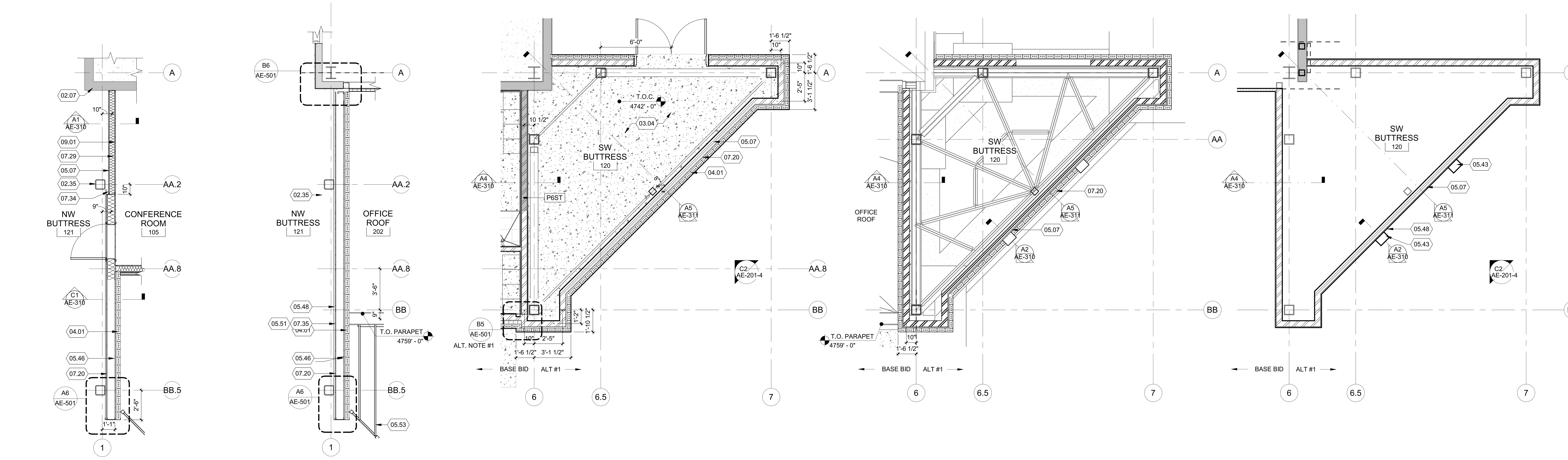
△	DATE	REVISION
8	4-15-22	Phase 4 RC #2

PROJECT NUMBER 18136

WALL SECTIONS

AE-311

05/18/2022 3:08:40 PM



D1 NW BUTTRESS WALL @ OPERATING LEVEL
SCALE: 1/4" = 1'-0"

D2 NW BUTTRESS WALL @ OFFICE ROOF
SCALE: 1/4" = 1'-0"

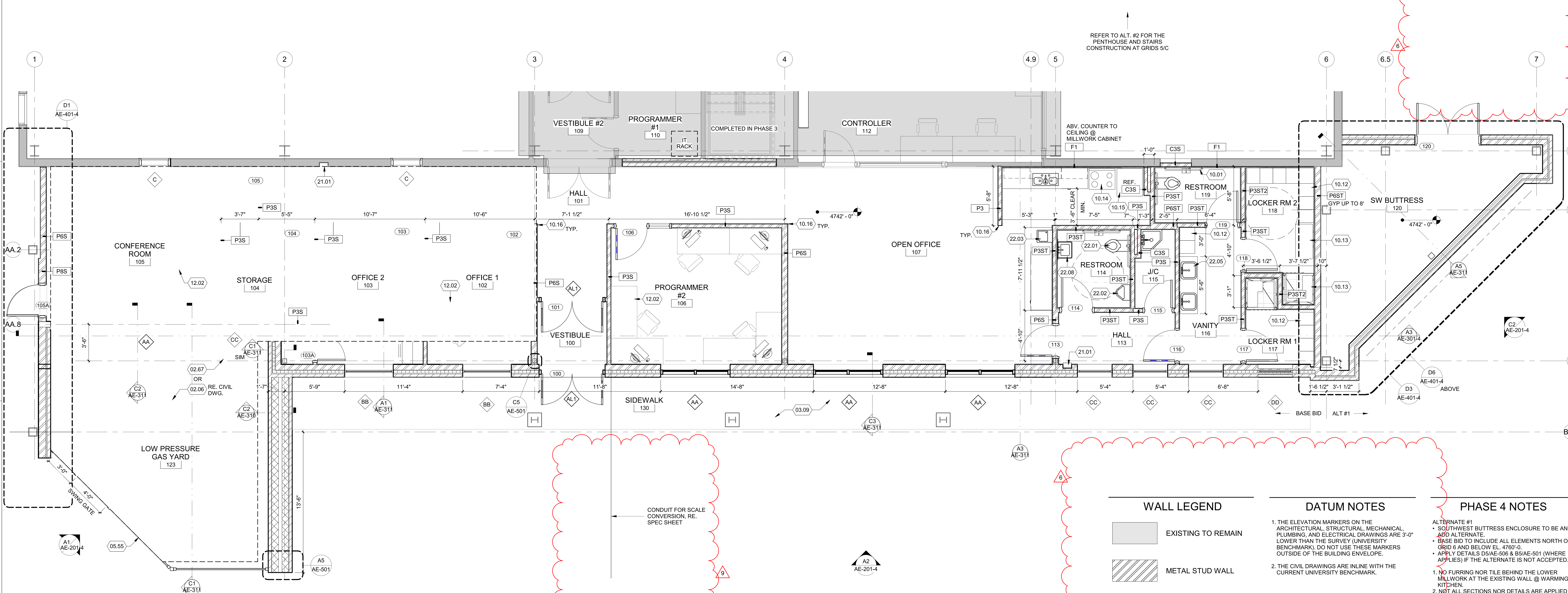
D3 SW BUTTRESS PLAN FROM 4742'-0" TO 4757'-0"
SCALE: 1/4" = 1'-0"

D4 SW BUTTRESS PLAN FROM 4757' TO 4776'
SCALE: 1/4" = 1'-0"

D6 SW BUTTRESS PLAN FROM 4776'-0" TO 4794'-8"
SCALE: 1/4" = 1'-0"

REFERENCE NOTES

02.06	EXISTING MASONRY WALL TO REMAIN TO 11'-8" A.F.F.
02.07	EXISTING MASONRY WALL TO REMAIN
02.35	EXISTING BUTTRESS FRAMEWORK FROM PREVIOUS PHASE TO REMAIN AND PROTECT
02.67	EXISTING CONCRETE FLOOR
03.04	CONCRETE SLAB ON GRADE
03.09	CONCRETE SIDEWALK, RE. CIVIL DWG.
04.01	STANDARD BRICK - 3/8" JOINT
05.07	6" METAL STUD
05.43	POWDER COATED ALUMINUM TRIM
05.46	8" METAL STUD
05.48	24 GAUGE PREPAINTED METAL PANEL WITH CONCEALED FASTENER, CAULKING AND CLOSURE ANGLE AT ALL EDGES AS REQ'D
05.51	18 GA (MIN.) STEEL STRAPPING, 16" O.C. OR PER METAL PANEL MANUFACTURER'S REQUIREMENT, TYPICAL AT ALL LOCATION IF Z GIRTS ARE NOT USED
05.53	1 1/2" DIA. METAL PIPE 18" O.C. WELDED TO STRUCTURAL W BEAMS, HOT DIPPED GALVANIZED, PAINTED
05.55	METAL FENCING: 1" PIPES SPACED AT 6" O.C. WITH 1 1/2" X 1/4" PLATES @ TOP AND BOTTOM AND 3 INTERMEDIATES; A 4' WIDE FULL HEIGHT SWING GATE WITH DEAD BOLT, KEYED BOTH SIDES; 3" X 3" STEEL POST AT CORNERS ARE REQ'D (TYP.) HOT DIP GALVANIZED, PAINTED, ANCHORED TO STRUCTURE ABOVE
07.20	1/2" EXTERIOR GLASS MAT SHEATHING
07.29	BATT INSULATION, MIN. R3 PER 1 INCH
07.34	VAPOR BARRIER, CONTINUOUS, TAPE AT ALL JOINTS
07.35	FLUID APPLIED WATER PROOFING
09.01	5/8" TYPE 'X' GYPSUM BOARD, PAINT
10.01	GRAB BAR
10.12	12" WIDE 18" DEEP SINGLE TIER LOCKER ON 6" MANUFACTURED BASE
10.13	FOLDING ADA BENCH
10.14	FREESTANDING RANGE, OWNER TO PROVIDE
10.15	COUNTER DEPTH REFRIGERATOR, PROVIDED BY GC
10.16	2" X 2" X 4' STAINLESS STEEL CORNER GUARD AT ALL OUTSIDE CORNERS, TYP.
12.02	MODULAR FURNITURE SYSTEMS PROVIDED BY GC
21.01	SEMI RECESSED FIRE EXTINGUISHER CABINET
22.01	WATER CLOSET, WALL HUNG
22.02	URINAL
22.03	ELECTRIC DRINKING FOUNTAIN
22.05	LAVATORY
22.08	SINK. RE: PLUMBING DRAWINGS



A1 ENLARGED OFFICE BUILDING FLOOR PLAN
SCALE: 1/4" = 1'-0"

WALL LEGEND

- EXISTING TO REMAIN
- METAL STUD WALL
- METAL PANEL

DATUM NOTES

1. THE ELEVATION MARKERS ON THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS ARE 3'-0" LOWER THAN THE SURVEY (UNIVERSITY BENCHMARK). DO NOT USE THESE MARKERS OUTSIDE OF THE BUILDING ENVELOPE.
2. THE CIVIL DRAWINGS ARE INLINE WITH THE CURRENT UNIVERSITY BENCHMARK.

PHASE 4 NOTES

ALTERNATE #1
- SOUTHWEST BUTTRESS ENCLOSURE TO BE AN ADD ALTERNATE.
- BASE BID TO INCLUDE ALL ELEMENTS NORTH OF GRID 6 AND BELOW EL. 4760'-0.
- APPLY DETAILS D5/AE-506 & B5/AE-501 (WHERE APPLIES) IF THE ALTERNATE IS NOT ACCEPTED.

1. NO FURRING NOR TILE BEHIND THE LOWER MILLWORK AT THE EXISTING WALL @ WARMING KITCHEN.
2. NOT ALL SECTIONS NOR DETAILS ARE APPLIED TO THIS PHASE, CERTAIN INFORMATION WERE ISSUED PREVIOUSLY

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · LICENSED ARCHITECT · 5/18/22

△	DATE	REVISION
6	3-30-22	Phase 4 RC #1
9	5-17-22	Ph. 4 Add #1

PROJECT NUMBER 18136

ENLARGED OFFICE BLDG. FLOOR PLAN

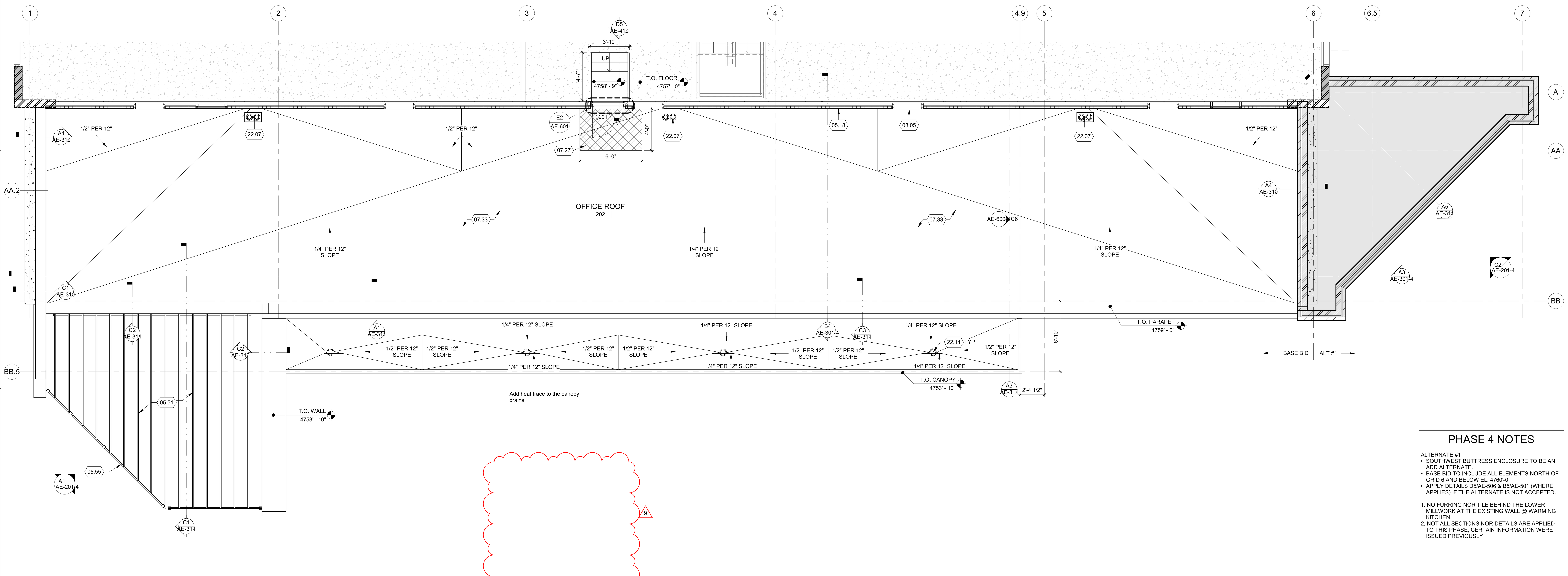
AE-401-4

5/17/2022 1:50:06 PM

05/18/2022 3:08:40 PM

REFERENCE NOTES

05.18 3" INSULATED METAL PANEL (R25) TO SPAN VERTICALLY, ATTACH TO STEEL FRAME OR METAL STUDS, ALSO RE. STRU. DWG.
05.51 18 GA (MIN.) STEEL STRAPPING, 16" O.C. OR PER METAL PANEL MANUFACTURER'S REQUIREMENT, TYPICAL AT ALL LOCATION IF Z GIRTS ARE NOT USED
05.55 METAL FENCING: 1" PIPES SPACED AT 6" O.C. WITH 1 1/2" X 1/4" PLATES @ TOP AND BOTTOM AND 3 INTERMEDIATES; A 4' WIDE FULL HEIGHT SWING GATE WITH DEAD BOLT, KEYED BOTH SIDES; 3" X 3" STEEL POST AT CORNERS ARE REQ'D (TYP.) HOT DIP GALVANIZED, PAINTED, ANCHORED TO STRUCTURE ABOVE
07.27 3' WIDE SINGLE PLY WALKWAY PAD, FULLY ADHERED. VERIFY AND FIELD ADJUST FOR ALL EXISTING/NEW ROOF TOP UNITS, PIPES, ETC..
07.33 ROOF ASSEMBLY, RE. TYP. ROOF DETAIL E4/AE-506
08.05 WINDOW, RE WINDOW SCHEDULE
22.07 ROOF DRAIN WITH OVERFLOW
22.14 SINGLE ROOF DRAIN



A1 ENLARGED OFFICE BUILDING ROOF PLAN
SCALE: 1/4" = 1'-0"

PHASE 4 NOTES

ALTERNATE #1
- SOUTHWEST BUTTRESS ENCLOSURE TO BE AN ADD ALTERNATE.
- BASE BID TO INCLUDE ALL ELEMENTS NORTH OF GRID 6 AND BELOW EL. 4760'-0.
- APPLY DETAILS D5/AE-506 & B5/AE-501 (WHERE APPLIES) IF THE ALTERNATE IS NOT ACCEPTED.

1. NO FURRING NOR TILE BEHIND THE LOWER MILLWORK AT THE EXISTING WALL @ WARMING KITCHEN.
2. NOT ALL SECTIONS NOR DETAILS ARE APPLIED TO THIS PHASE, CERTAIN INFORMATION WERE ISSUED PREVIOUSLY

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · LICENSED ARCHITECT

	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

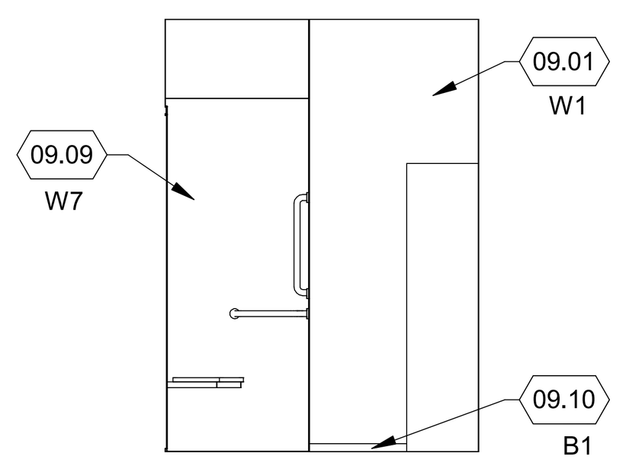
PROJECT NUMBER 18136

ENLARGED OFFICE BLDG. ROOF PLAN

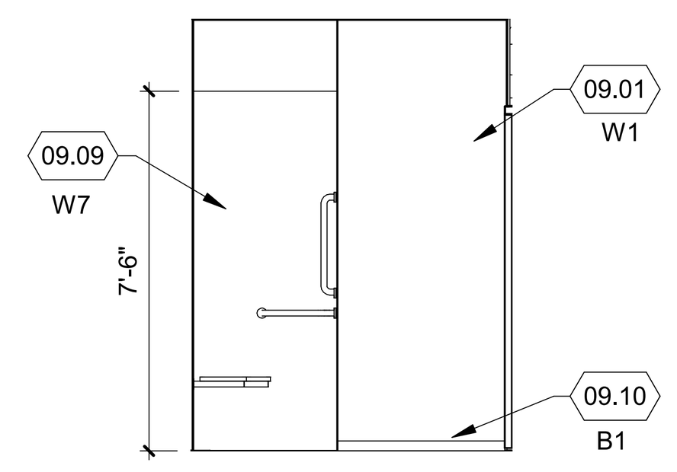
AE-402-4

5/17/2022 1:50:07 PM

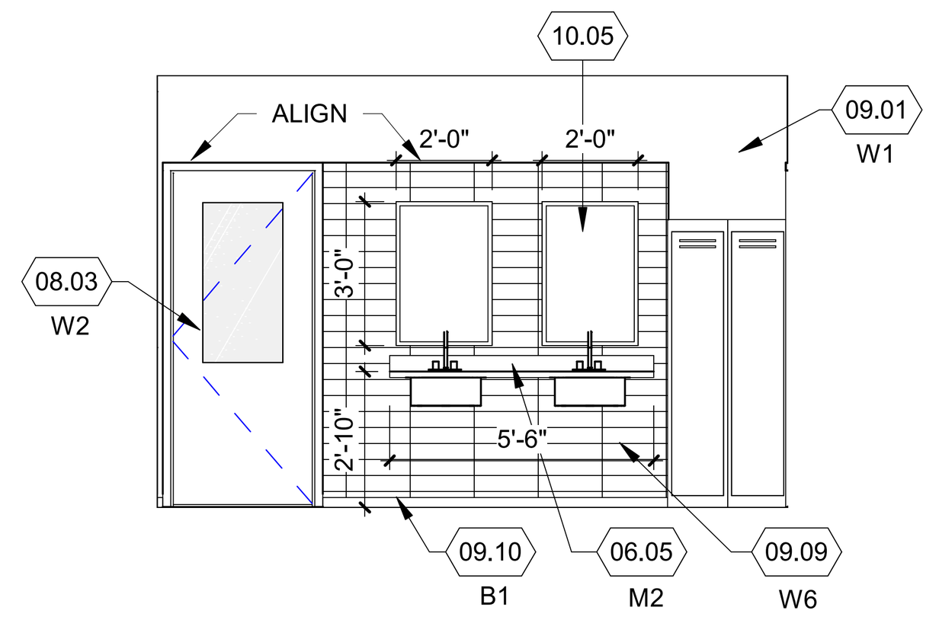
05/18/2022 3:08:40 PM



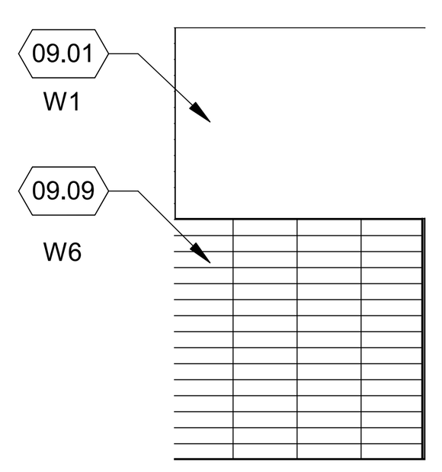
E1 LOCKER RM 117 N
SCALE: 1/4" = 1'-0"



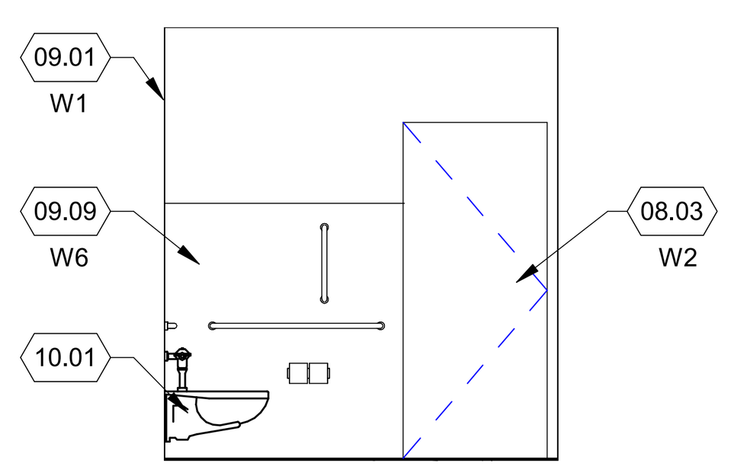
E2 LOCKER RM 118 S
SCALE: 1/4" = 1'-0"



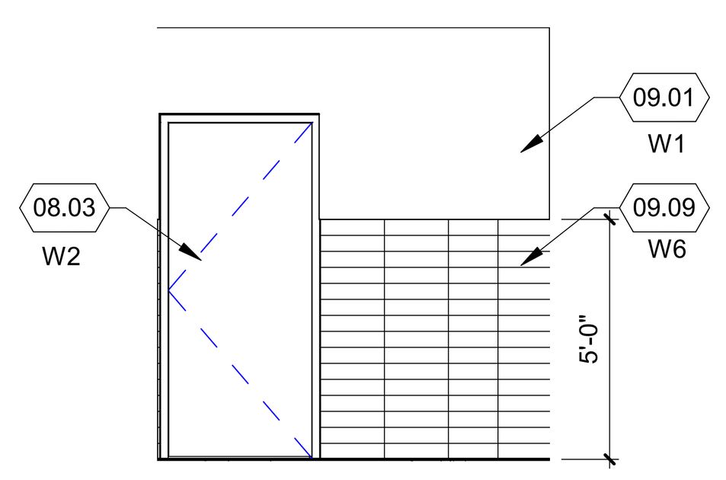
E3 VANITY 116 W
SCALE: 1/4" = 1'-0"



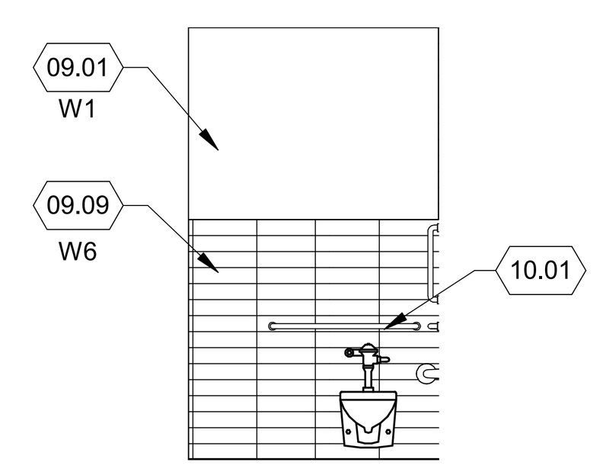
D1 RR 119 E
SCALE: 1/4" = 1'-0"



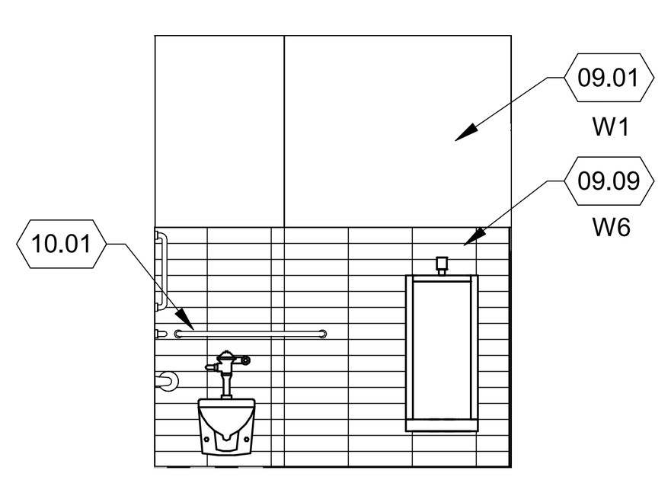
D2 RR 119 N
SCALE: 1/4" = 1'-0"



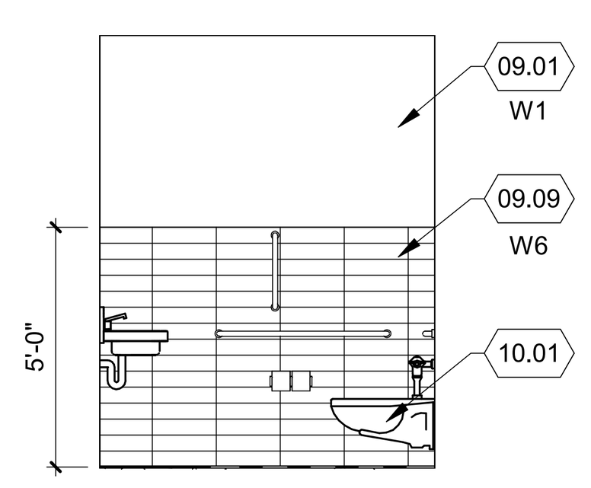
D3 RR 119 S
SCALE: 1/4" = 1'-0"



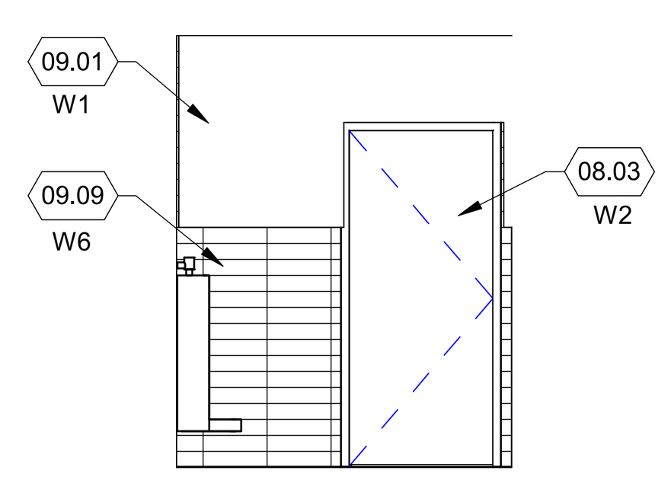
D4 RR 119 W
SCALE: 1/4" = 1'-0"



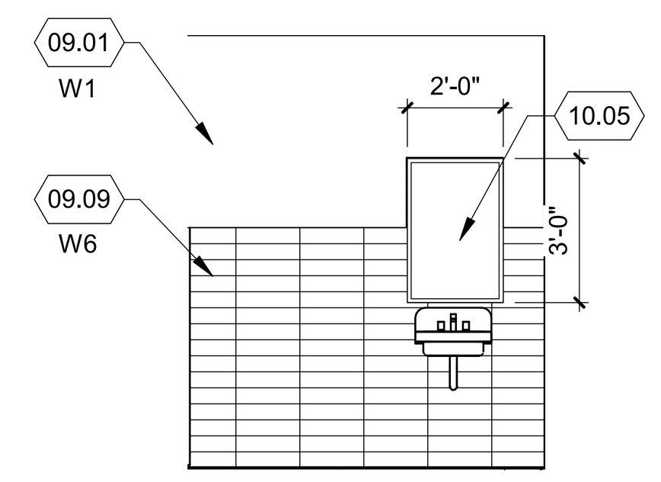
C1 RR 114 E
SCALE: 1/4" = 1'-0"



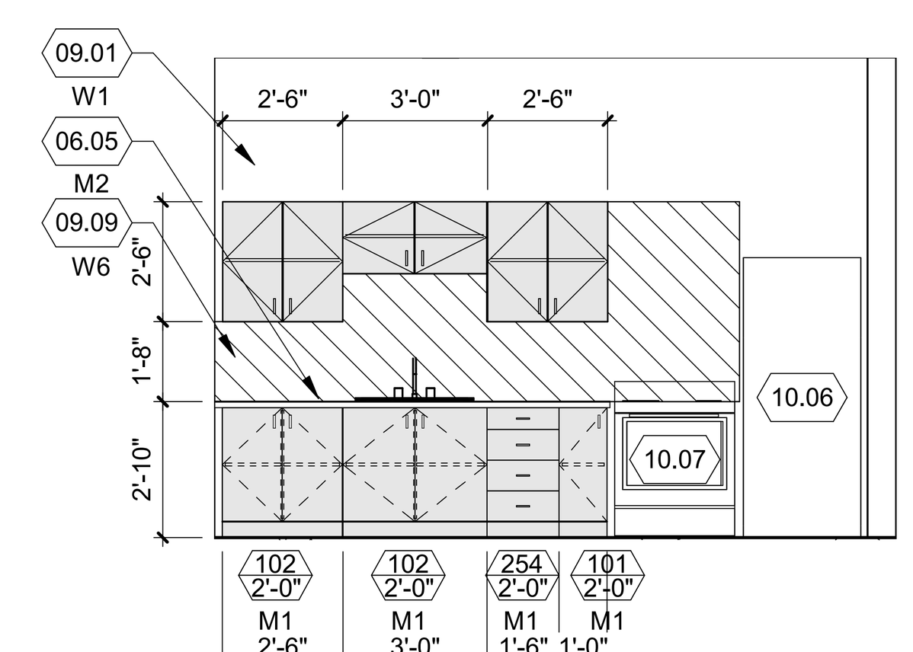
C2 RR 114 N
SCALE: 1/4" = 1'-0"



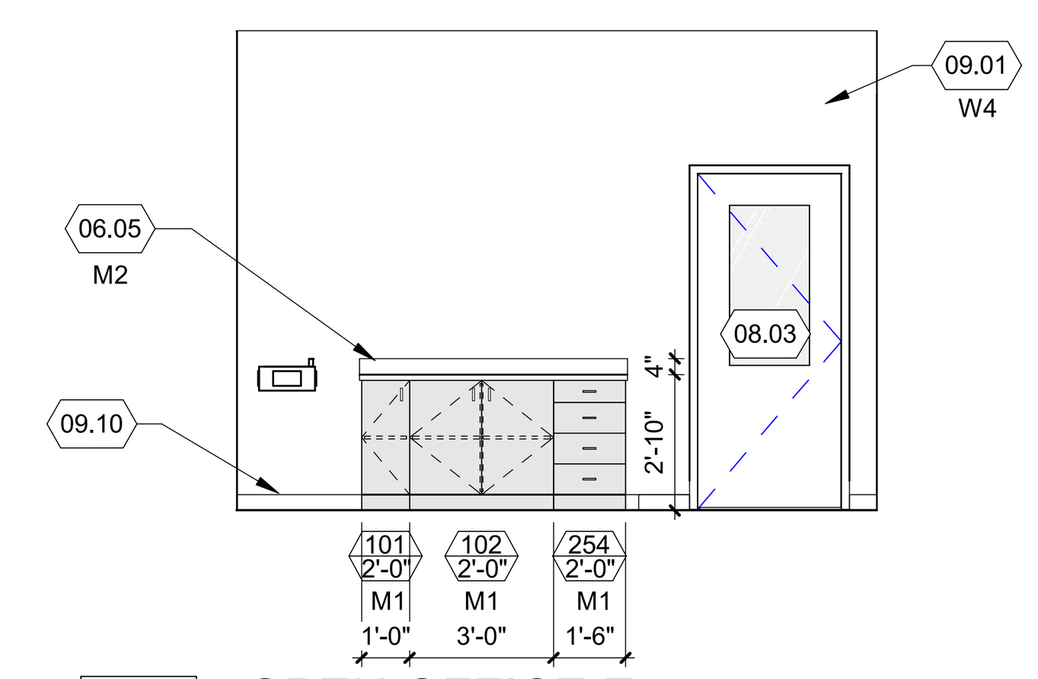
C3 RR 114 S
SCALE: 1/4" = 1'-0"



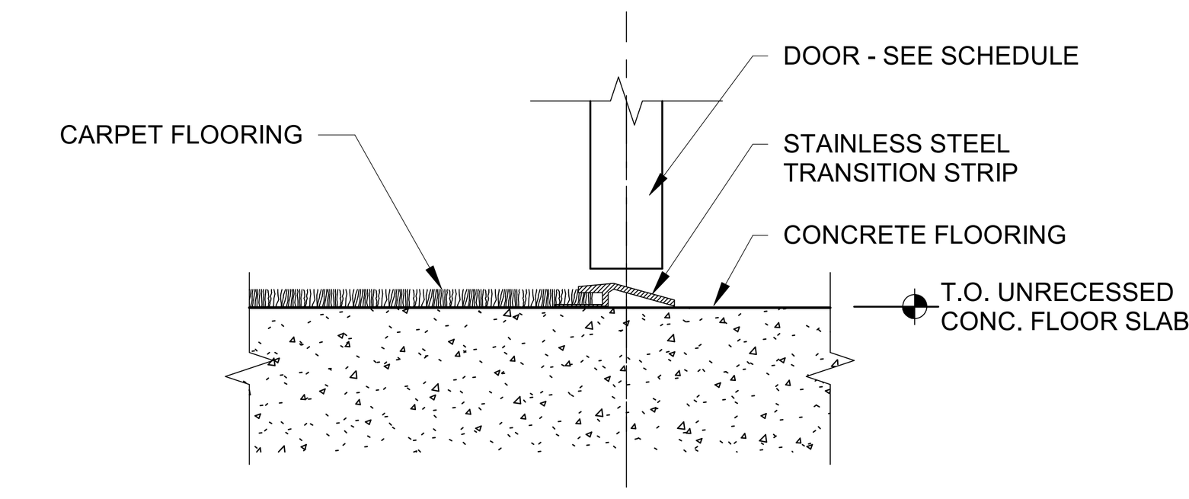
C4 RR 114 W
SCALE: 1/4" = 1'-0"



C5 BREAK ROOM N
SCALE: 1/4" = 1'-0"



C6 OPEN OFFICE E
SCALE: 1/4" = 1'-0"



C7 CONCRETE TO CARPET TRANSITION
SCALE: 3" = 1'-0"

FINISH LEGEND						
CODE	PRODUCT TYPE	MANUFACTURER	STYLE	COLOR	SPECIFICATIONS	NOTES
BASE						
B1	RUBBER BASE	JOHNSONITE	STANDARD COVE	29 MOONROCK	4" H	GENERAL BASE
CEILING						
ACT1	ACOUSTIC CEILING TILE	ARMSTRONG	DUNE 1774	WHITE	24"X24", LAY IN 15/16" GRID, WHITE	GENERAL CEILING
ACT2	ACOUSTIC CEILING TILE	ARMSTRONG	CLEAN ROOM VL	WHITE	24"X24", LAY IN 15/16" GRID, WHITE	KITCHEN AREA
FLOORING						
F1	CARPET TILE	MILLIKEN	COMMON THREAD POINT 3	GIANT SEQUOIA WITH LAVA PTT 169-25	24"X24" INSTALL: 50% WITH LAVA STRIPE, ASHLAR	GENERAL CARPET
F2	SEALDED CONCRETE	TBD		NATURAL	-	
F3	MOSAIC PORCELAIN TILE	DALTILE	KEYSTONES	SUEDE GRAY SPECKLE D208	2" HEXAGON, GROUT: MAPEI CHARCOAL 47	SHOWER FLOOR
MILLWORK						
M1	PLASTIC LAMINATE	WILSONART		FROSTY WHITE 1573		BREAKROOM CABINETS
M2	QUARTZ COUNTERTOP	PENTAL	POLISHED	STORMY SKY BS250P	3CM, EASED EDGE PROFILE, POLISHED	BREAKROOM COUNTERTOPS
M3	SOLID SURFACE	WILSONART		HOT STONE 9201GS	2CM, EASED EDGE PROFILE, POLISHED	WINDOW SILLS
MISCELLANEOUS						
BLD1	BLINDS	BALI	CLASSIC BLINDS 3000 SERIES	WHITE	1" WIDE VIRGIN ALUMINUM ALLOYED WITH CLEAR PLASTIC WAND	AT ALL WINDOWS
WALL						
W1	PAINT	SHERWIN WILLIAMS		CEILING BRIGHT WHITE SW7007	EGGSHELL ON WALLS, FLAT ON CEILINGS	GENERAL PAINT
W2	PAINT	SHERWIN WILLIAMS		GAUNTLET GRAY SW7019	SEMI-GLOSS ON TRIM, 2X COATS	DOOR AND FRAME
W3	PAINT	SHERWIN WILLIAMS		FELTED WOOL SW9171	EGGSHELL ON WALLS, FLAT ON CEILINGS, 2X COATS	ACCENT
W4	PAINT	PPG		RED GUMBALL PPG1187-7	EGGSHELL ON WALLS, FLAT ON CEILINGS, 2X COATS	ACCENT
W5	FIBER REINFORCED PANEL	CRANE COMPOSITES	PEBBLED	WHITE	4'x8' SHEETS, USE COORDINATING TRIM WORK TO FINISH EXPOSED EDGES	JANITOR WET WALLS
W6	PORCELAIN TILE	DALTILE	COLORWHEEL LINEAR	ARCTIC WHITE 0790, MATTE	4"X16", INSTALL: STACKED, GROUT: MAPEI CHARCOAL 47, USE COORDINATING BULLNOSE TRIM	BACKSPLASH, RR TILE
W7	PORCELAIN TILE	DALTILE	PANORAMIC	MANOR WHITE	63"X126", INSTALL: MONOLITHIC, GROUT: MAPEI AVALANCHE 38, CAP ALL UNFINISHED ENDS WITH SCHLUTER SCHIENE IN ALUMINUM	SHOWER WALL TILE

REFERENCE NOTES

06.05	COUNTERTOP
08.03	DOOR. RE DOOR SCHEDULE
09.01	5/8" TYPE 'X' GYPSUM BOARD, PAINT
09.09	WALL TILE
09.10	WALL BASE
10.01	GRAB BAR
10.05	MIRROR
10.06	REFRIGERATOR
10.07	RANGE
10.11	MANUAL ROLLER SHADE

9

GENERAL NOTES

1. SEE FLOOR FINISH DETAILS FOR FLOOR TO FLOOR TRANSITIONS. ALL TRANSITIONS TO OCCUR AT CENTER OF DOOR, U.N.O
2. REFER TO FINISH LEGEND ON SHEET AE-600-4 FOR ALL FINISHES.
3. PROVIDE FINISHED PANEL AT ALL EXPOSED MILLWORK, TO MATCH ADJACENT FINISH.
4. ALL CABINET PULLS TO BE SCHAUB AND COMPANY SS-096 STAINLESS STEEL OR SIMILAR. SUBMIT FOR APPROVAL.
5. ALL CABINET INTERIORS AND SHELVES TO BE FINISHED IN WHITE MELAMINE, TYP.
6. SEAL ALL TILE TRANSITIONS FROM FLOOR TO WALL TILE WITH CLEAR EPOXY BEAD.
7. ALL HOLLOW METAL DOORS AND FRAMES TO BE W2, U.N.O.
8. PROVIDE 2" X 2" X 4' H CORNER GUARDS AT ALL OUTSIDE CORNERS.

FINISH LEGEND

Room name
101
F | B | W

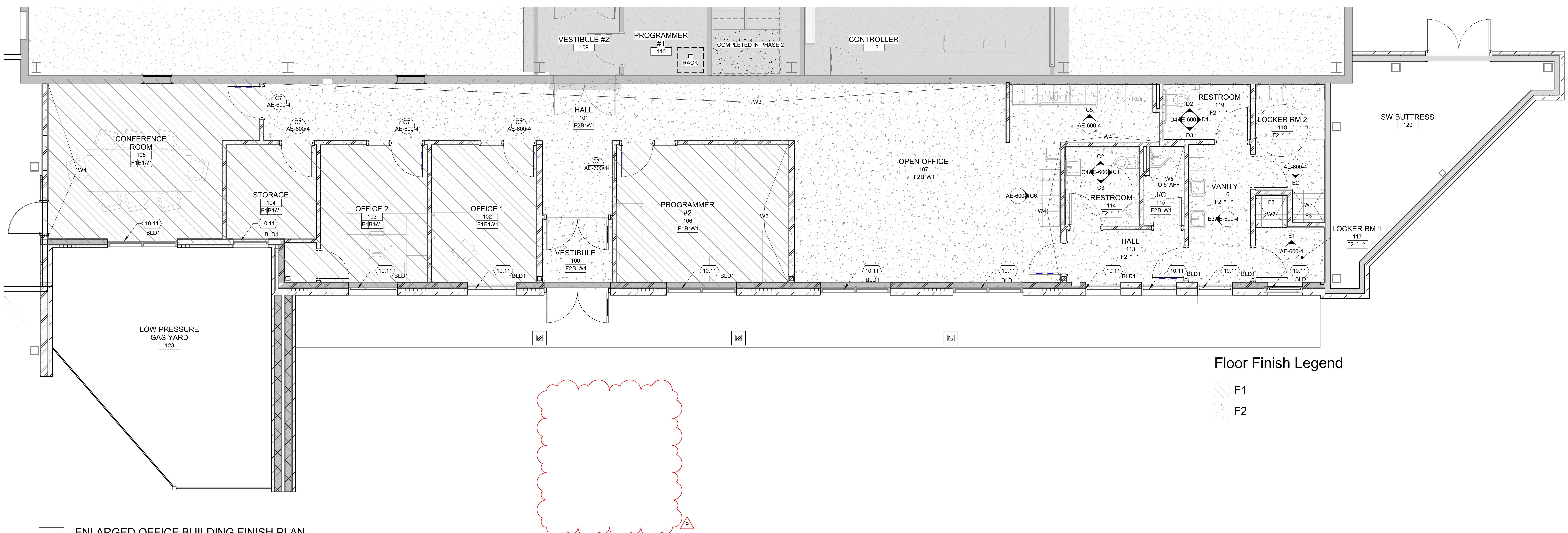
ROOM IS NOT ELEVATED, ALL FINISHES ARE SHOWN IN THE TAG

ONLY FLOOR FINISH, SEE ROOM'S INTERIOR ELEVATIONS FOR VERTICAL FINISHES

F = FLOOR FINISH
B = BASE FINISH
W = WALL FINISH

NF = NO FINISH
* = SEE FINISH TAG ON LARGE SCALE DRAWING

SEE FINISH LEGEND FOR FINISHES



Floor Finish Legend

F1

F2

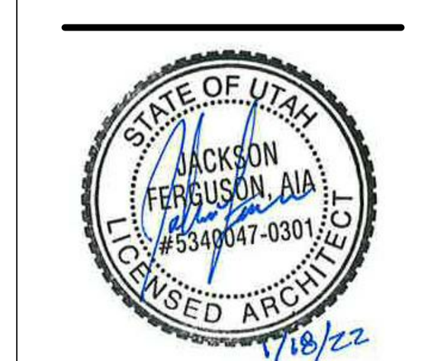
9

A1 ENLARGED OFFICE BUILDING FINISH PLAN
SCALE: 1/4" = 1'-0"

5/17/2022 1:50:22 PM

FFKR ARCHITECTS
730 Pacific Avenue - Salt Lake City, Utah 84104
O 801.521.6186 - FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

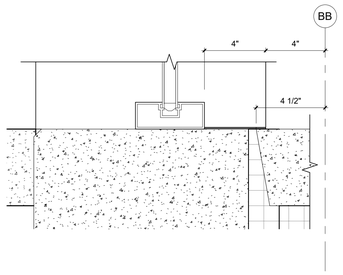


△	DATE	REVISION
9	5-17-22	Ph. 4 Add #1

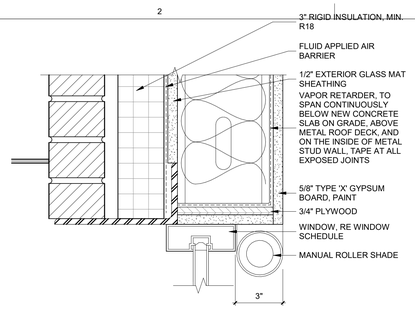
PROJECT NUMBER 18136

FINISH SCHEDULE AND PLAN

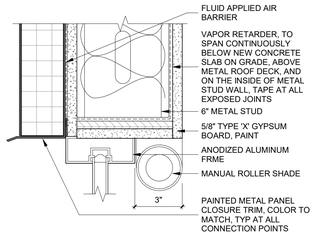
AE-600-4



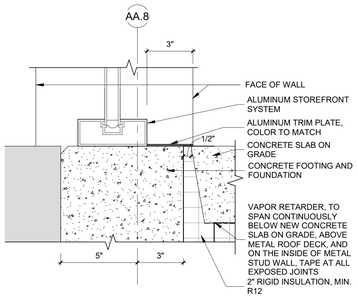
E1 ALU. SILL DETAIL
SCALE: 3" = 1'-0"



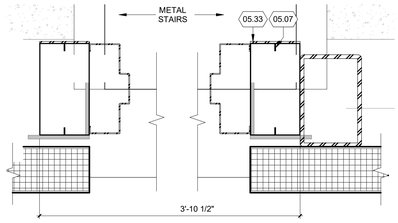
D2 ALU. HEAD DETAIL
SCALE: 3" = 1'-0"



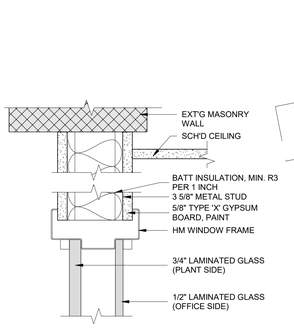
D3 ALU. HEAD DETAIL
SCALE: 3" = 1'-0"



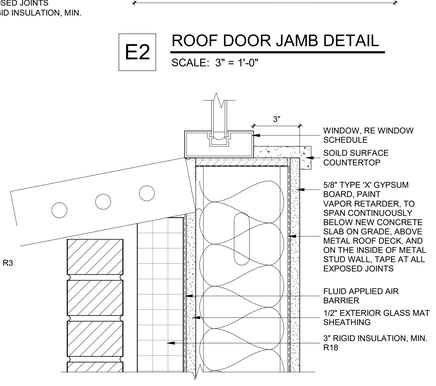
D1 ALU SILL DETAIL
SCALE: 3" = 1'-0"



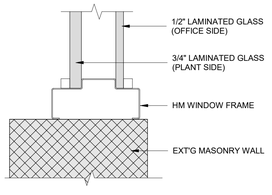
E2 ROOF DOOR JAMB DETAIL
SCALE: 3" = 1'-0"



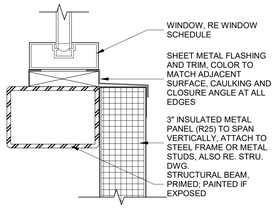
C1 SOUND GLASS DETAIL
SCALE: 3" = 1'-0"



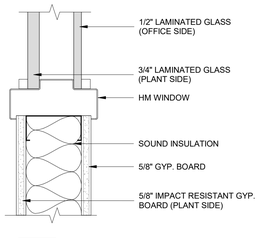
C2 ALU. SILL DETAIL
SCALE: 3" = 1'-0"



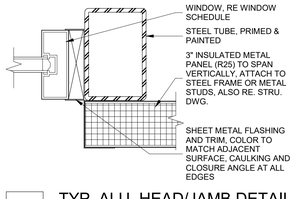
B1 SOUND GLASS DETAIL
SCALE: 3" = 1'-0"



B2 TYP. ALU. SILL DETAIL
SCALE: 3" = 1'-0"



A1 SOUND GLASS DETAIL
SCALE: 3" = 1'-0"



A2 TYP. ALU. HEAD/JAMB DETAIL
SCALE: 3" = 1'-0"

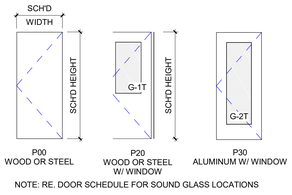
PREVIOUSLY ISSUED WITH PHASE 3

DOOR AND FRAME SCHEDULE-PHASE 3

DOOR NUMBER	DOOR SIZE WIDTH	DOOR SIZE HEIGHT	DOOR THICK	DOOR LEAF 1 TYPE	DOOR LEAF 2 TYPE	DOOR MATERIAL	FRAME TYPE	FRAME MATERIAL	FIRE RATING (MINUTES)	HARDWARE GROUP	NOTES*
OPERATING FLOOR											
109	6' - 0"	7' - 0"	1 3/4"	P20	P20	HM	F00	HM	0		INSULATED SLAB WITH SOUND PROOF GLAZING
109A	6' - 0"	7' - 0"	1 3/4"	P20	P20	HM	F00	HM	0		INSULATED SLAB WITH SOUND PROOF GLAZING
110	3' - 0"	7' - 0"	1 3/4"	P01		HM	F00	HM	0		INSULATED SLAB WITH SOUND PROOF GLAZING
110A	3' - 0"	7' - 0"	1 3/4"	P20		HM	F00	HM	0		INSULATED SLAB WITH SOUND PROOF GLAZING
112	3' - 0"	7' - 0"	1 3/4"	P20		HM	F22.2	HM	0		INSULATED SLAB WITH SOUND PROOF GLAZING
112A	3' - 0"	7' - 0"	1 3/4"	P20		HM	F22.1A : .	HM	0		INSULATED SLAB WITH SOUND PROOF GLAZING

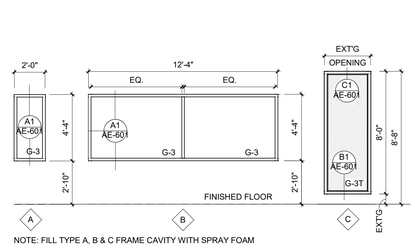
DOOR AND FRAME SCHEDULE-PHASE 4

DOOR NUMBER	DOOR SIZE WIDTH	DOOR SIZE HEIGHT	DOOR THICK	DOOR LEAF 1 TYPE	DOOR LEAF 2 TYPE	DOOR MATERIAL	FRAME TYPE	FRAME MATERIAL	FIRE RATING (MINUTES)	HARDWARE GROUP	NOTES*
OPERATING FLOOR											
100	5' - 11"	7' - 0"	1/4"	P30	P30	Aluminum	*	Aluminum	0	A1	
101	5' - 11"	7' - 0"	1/4"	P30	P30	Aluminum	*	Aluminum	0	B1	
102	3' - 0"	7' - 0"	1 3/4"	P20		HM	F21	HM	0	07	
103	3' - 0"	7' - 0"	1 3/4"	P20		HM	F21	HM	0	07	
104	3' - 0"	7' - 0"	1 3/4"	P20		HM	F00	HM	0	07	
105	3' - 0"	7' - 0"	1 3/4"	P20		HM	F00	HM	0	05	
105A	3' - 0"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	08	
106	3' - 0"	7' - 0"	1 3/4"	P20		HM	F21	HM	0	07	
113	3' - 0"	7' - 0"	1 3/4"	P20		HM	F00	HM	0	03	
114	3' - 0"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	06	
115	2' - 8"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	09	
116	3' - 0"	7' - 0"	1 3/4"	P20		HM	F00	HM	0	04	
117	3' - 0"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	04	
118	3' - 0"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	03	
119	3' - 0"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	06	
120	6' - 0"	7' - 0"	1 3/4"	P00	P00	HM	F00	HM	0	01	
PIPING FLOOR											
201	3' - 0"	7' - 0"	1 3/4"	P00		HM	F00	HM	0	02	



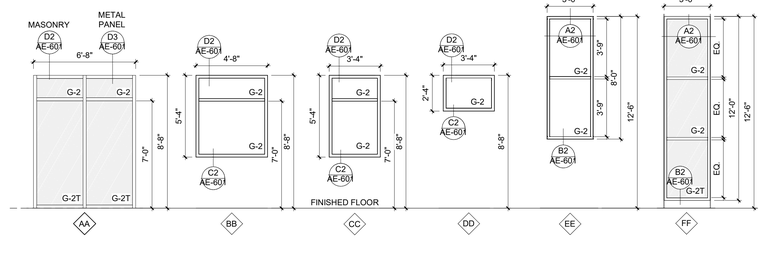
NOTE: RE. DOOR SCHEDULE FOR SOUND GLASS LOCATIONS

C6 DOOR PANELS
SCALE: 1/4" = 1'-0"

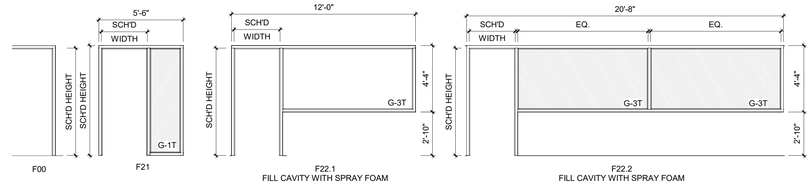


NOTE: FILL TYPE A, B & C FRAME CAVITY WITH SPRAY FOAM

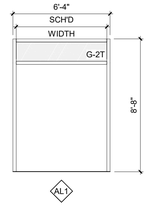
B3 INTERIOR WINDOW TYPES (HOLLOW METAL)
SCALE: 1/4" = 1'-0"



B4 EXTERIOR WINDOW TYPES (FIXED ALUMINUM)
SCALE: 1/4" = 1'-0"



A3 HOLLOW METAL DOOR FRAMES
SCALE: 1/4" = 1'-0"



A6 ALUMINUM DOOR FRAME
SCALE: 1/4" = 1'-0"

6

GLAZING SCHEDULE

G-1 GLAZING TYPE

G-1	FLOAT GLASS
G-1T	FLOAT GLASS - TEMPERED
G-2	INSULATED GLASS U-VALUE 0.22, SHGC 0.39
G-2T	INSULATED GLASS - TEMPERED U-VALUE 0.22, SHGC 0.39
G-3	LAMINATED SOUND GLASS
G-3T	LAMINATED SOUND GLASS - TEMPERED

ALL INSULATED GLASS TO BE SOLARBAN 60 W/ A U-FACTOR OF 0.22 AND SHGC 0.39 OR BETTER

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4
SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · 13-6047-4301 · LICENSED ARCHITECT

△	DATE	REVISION
4	10-27-21	Ph. 3 PR #5
6	3-30-22	Phase 4 RC #1

PROJECT NUMBER 18136

DOORS AND WINDOW SCHEDULE

AE-601

A3 PARTITION TYPES

SCALE: 1 1/2" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

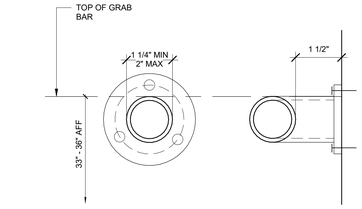
STATE OF UTAH · JACKSON FERGUSON, AIA · 7934047-0301 · LICENSED ARCHITECT · 1/18/22

△	DATE	REVISION
6	3-30-22	Phase 4 RC #1
8	4-15-22	Phase 4 RC #2

PROJECT NUMBER 18136

PARTITION TYPES & DETAILS

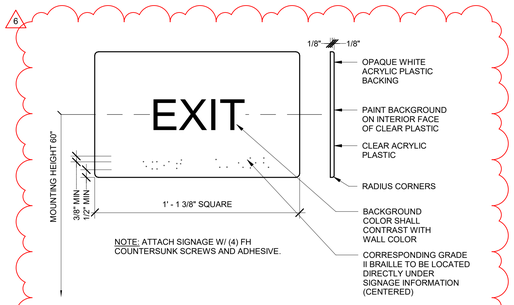
AE-602



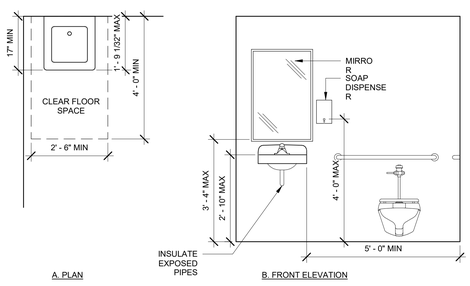
NOTE: ALLOWABLE STRESSES SHALL NOT BE EXCEEDED FOR MATERIALS USED WHERE A VERTICAL OR HORIZONTAL FORCE OF 250 LBS. IS APPLIED AT ANY POINT ON THE GRAB BAR, FASTENER MOUNTING DEVICE OR SUPPORTING STRUCTURE.

REF:
ADA: 609.1
ANSI: 609.2

C5 GRAB BAR
SCALE: 6" = 1'-0"

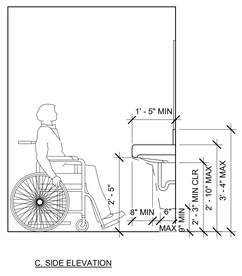


C6 TACTILE SIGNAGE
SCALE: 3" = 1'-0"



A. PLAN

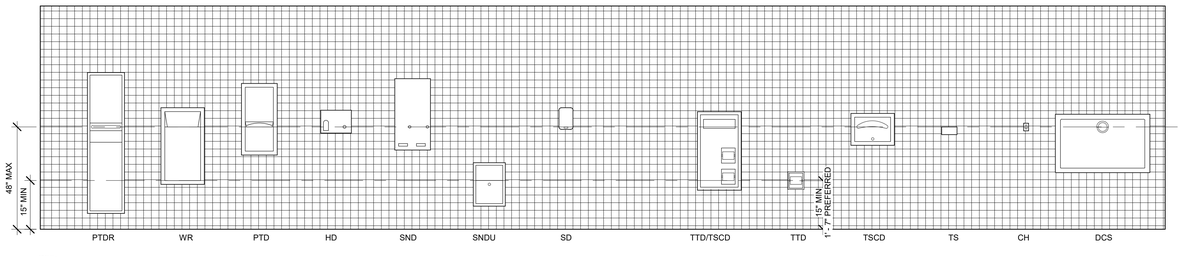
B. FRONT ELEVATION



C. SIDE ELEVATION

REF:
ADA: 603.3, 604.3.2, 606.1, 606.5
ANSI: 606.1

B1 ACCESSIBLE LAVATORY
SCALE: 1/2" = 1'-0"

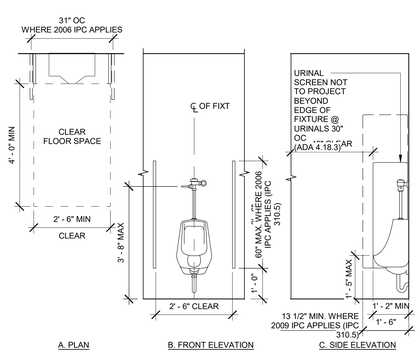


REF:
ADA: 308.2.1,604.7
ANSI: 604.7

SANITARY ACCESSORIES LIST

ABBREVIATIONS	DESCRIPTIONS
CH	COAT HOOK
DCS	DIAPER CHANGING STATION
HD	HAND DRYER
PTD	PAPER TOWEL DISPENSER
PTDR	PAPER TOWEL DISPENSER/WASTE RECEPTACLE
SD	SOAP DISPENSER
SND	SANITARY NAPKIN DISPENSER
SNDU	SANITARY NAPKIN DISPOSAL UNIT
SS	SHOWER SEAT
TS	TOILETRY SHELF
TTD	TOILET TISSUE DISPENSER
TSCD	TOILET SEAT COVER DISPENSER
TTD/TSCD	TOILET TISSUE DISPENSER/TOILET SEAT COVER DISPENSER
WR	WASTE RECEPTACLE

B3 MOUNTING HEIGHTS - SANITARY ACCESSORIES
SCALE: 1/2" = 1'-0"



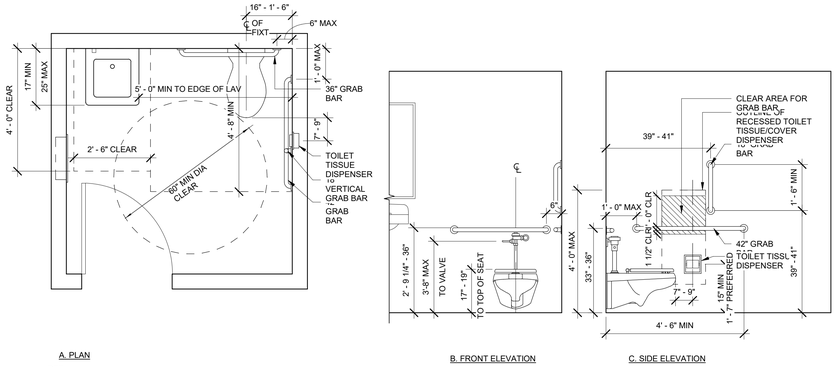
A. PLAN

B. FRONT ELEVATION

C. SIDE ELEVATION

REF:
ADA: 605.1
IPC: 310.5
ANSI: 605.1

A1 ACCESSIBLE URINAL
SCALE: 1/2" = 1'-0"



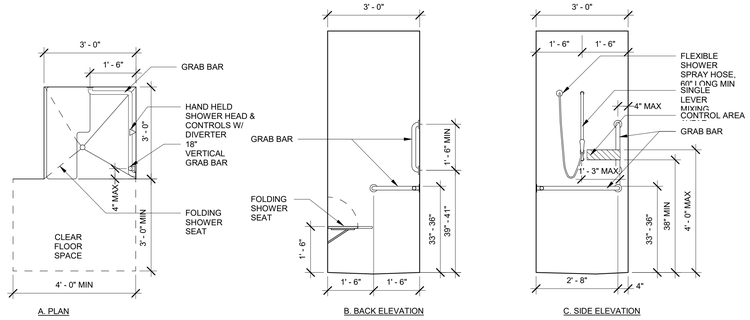
A. PLAN

B. FRONT ELEVATION

C. SIDE ELEVATION

REF:
ADA: 603.2, 604.2, 604.3.2, 604.7, 604.8, 609.1
ANSI: 604.4

A2 SINGLE-ACCOMODATION TOILET ROOM
SCALE: 1/2" = 1'-0"



A. PLAN

B. BACK ELEVATION

C. SIDE ELEVATION

REF:
ADA: 608.2.1
ANSI: 608.2.1

A5 ACCESSIBLE SHOWER - TRANSFER TYPE
SCALE: 1/2" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE PROJECT #22508 - PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

STATE OF UTAH · JACKSON FERGUSON, AIA · #534047-0301 · LICENSED ARCHITECT · 7/18/22

△	DATE	REVISION
6	3-30-22	Phase 4 RC #1

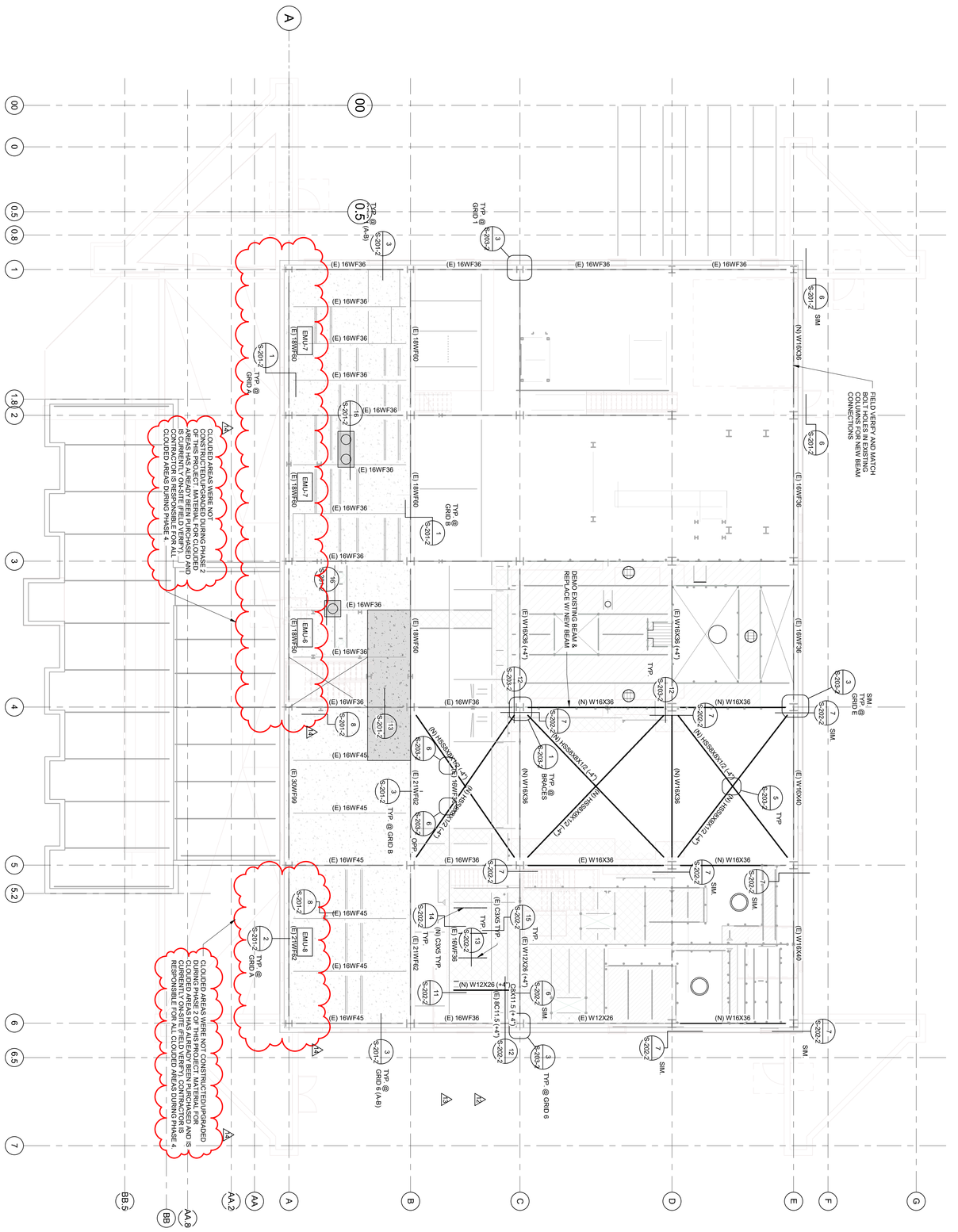
PROJECT NUMBER 18136

ADA RESTROOM ACCESS & SIGNAGE DIAGRAMS

AE-603

PIPING FLOOR FRAMING PLAN / OFFICE ROOF FRAMING PLAN - PHASE 2

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



PIPING FLOOR FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL IS 4"/6" - 6 3/4" U.N.O. (FIELD VERIFY).
2. TOP OF NEW STEEL IS 4" - 6 3/4" (FIELD VERIFY).
   BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. = EXISTING WALL
4. = EXISTING SUSPENDED CONCRETE SLAB
5. = NEW 4" SHOTCRETE BELOW EXISTING SLAB. SEE DETAIL 13/S-201-2
6. = NEW 4" HOUSEKEEPING PAD. SEE 16/S-201-2
7. SEE DETAIL 17/S-201-2 FOR GROUTING OF EXISTING SLAB PENETRATIONS

NORTH

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

	DATE	REVISION
8	5/21/21	PR #5
12	3/31/22	PHASE 3 PR
7		PHASE 2
13	12/14/21	CCD #1
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18823

PIPING FLOOR PLAN - PHASE 2

S-102-2

PROFESSIONAL STRUCTURAL ENGINEER — STATE OF UTAH — No. 276196 — Robert M. Hoyle

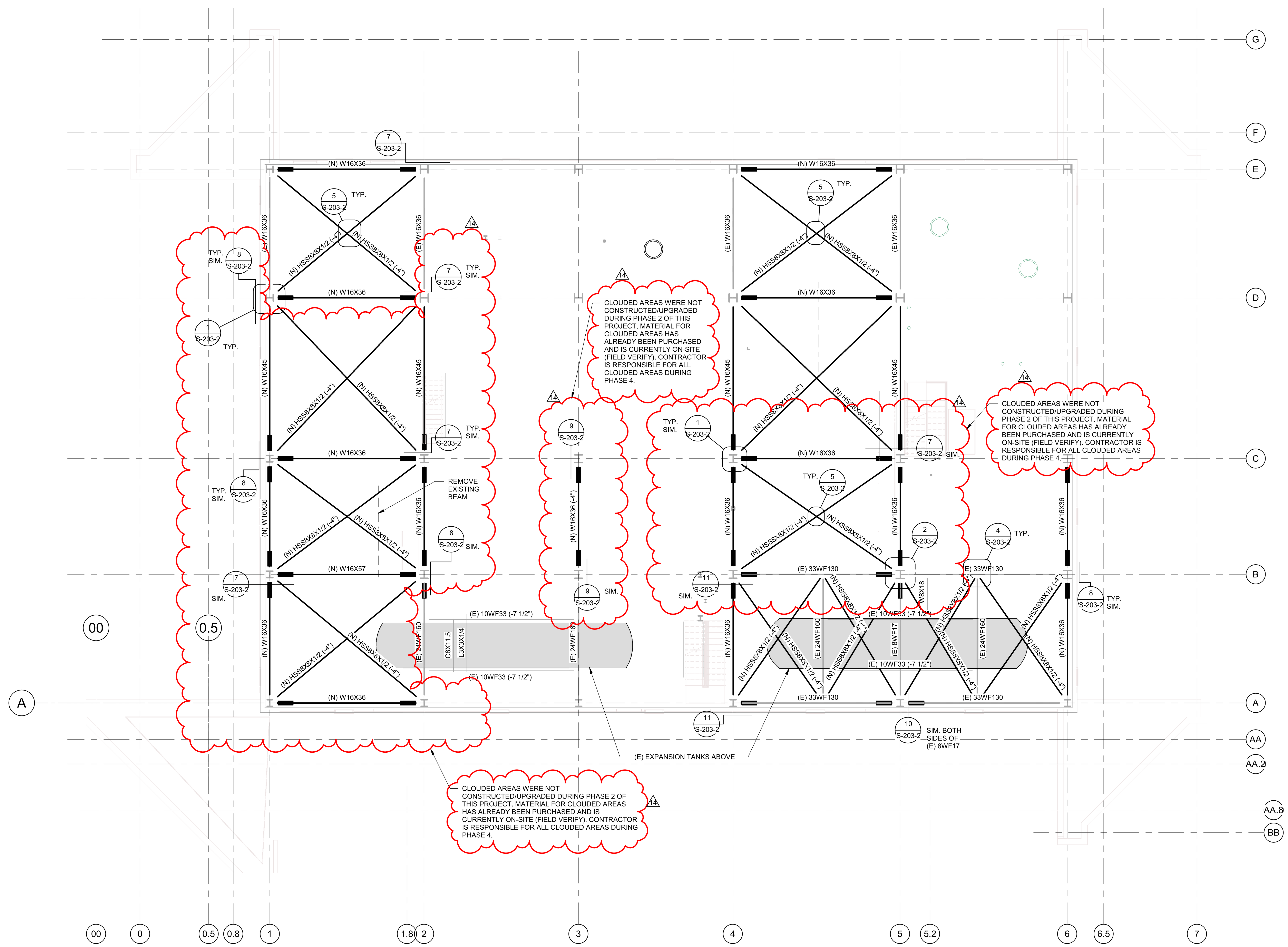
50 Years 1969 - 2019 ENGINEERS
structural consultants
1594 W. Park Dr. Ogden, Utah 84404
ph. 801.782.8008 fx. 801.782.4656

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

05/18/2022 3:08:41 PM

GENERAL NOTES:

1. TOP OF EXISTING STEEL IS 4769'-6" U.N.O. (FIELD VERIFY)
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING - SEE LEGEND OF SYMBOLS & ABBREVIATIONS
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. ▬ = BEAM TO BEAM SHEAR PLATE ABOVE FRAMING. SEE DETAIL 7/S-203-2.



SUB-FAN FLOOR FRAMING PLAN - PHASE 2

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

A / S-103A-2

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

ARW ENGINEERS structural consultants
50 Years 1969 - 2019
1594 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4
SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

PROFESSIONAL STRUCTURAL ENGINEER
No. 276196
Robert M. Moyle
1/17/22
STATE OF UTAH

△	DATE	REVISION
2	1/5/21	ADDENDUM 3
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18923

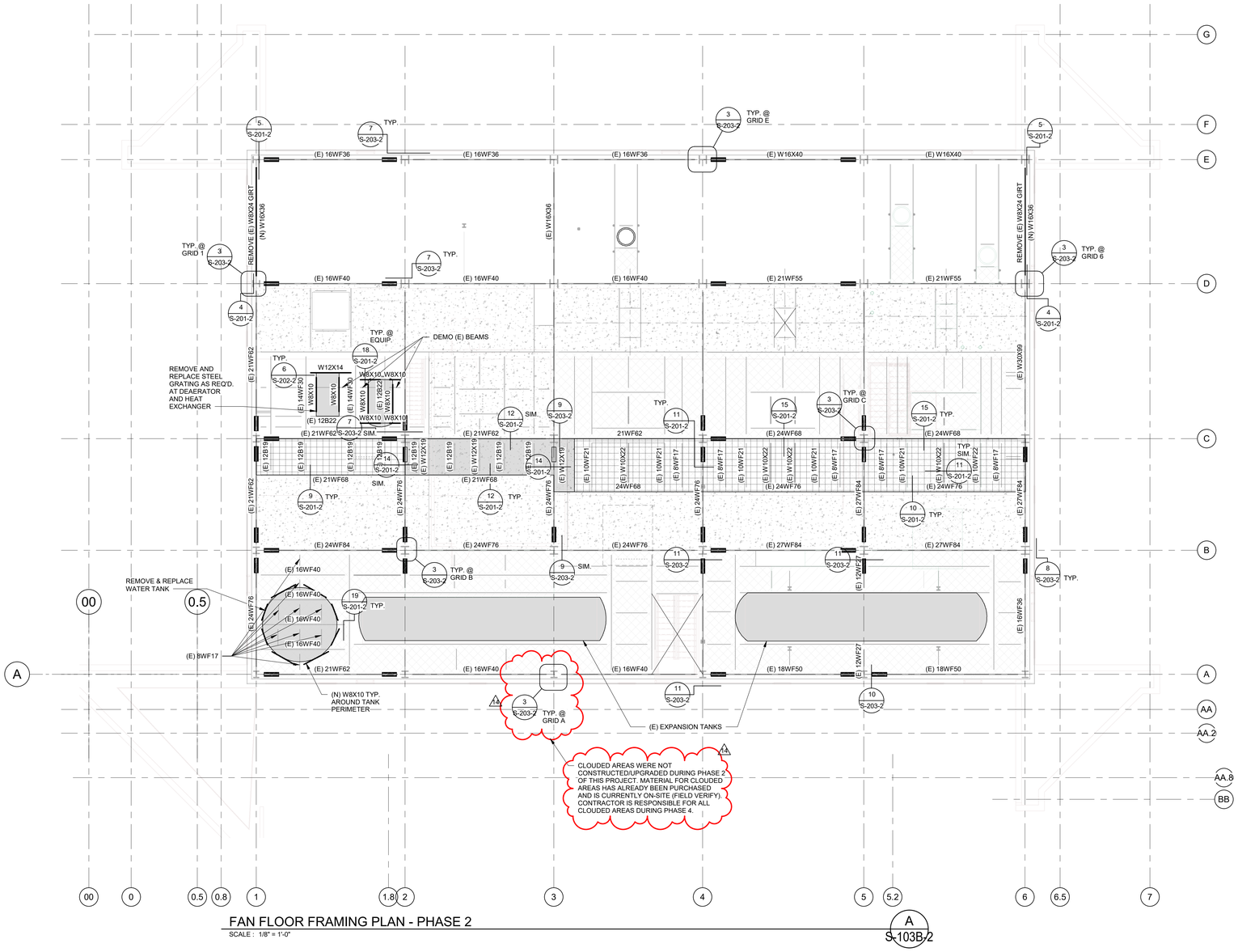
SUB-FAN FLOOR FRAMING PLAN - PHASE 2

S-103A-2

5/16/2022 10:43:56 AM

FAN FLOOR FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL IS 4771' - 10 3/4" U.N.O. (FIELD VERIFY) - FINISHED FLOOR ELEVATION IS 4772' - 0" (FIELD VERIFY)
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. = EXISTING GRATING
4. = EXISTING SUSPENDED CONCRETE SLAB
5. = NEW 6" TOTAL LIGHTWEIGHT REINFORCED CONCRETE SLAB ON 20 GAGE FORMLOK B DECK. REINFORCE WITH #5 AT 12"o.c. EACH WAY.
6. = NEW 6" REINFORCED SHOTCRETE BELOW EXSITING B DECK AT ELECTRICAL ROOM. REINFORCE WITH #5 AT 12"o.c. EACH WAY.
7. = BEAM-TO-BEAM SHEAR PLATE BELOW FRAMING. SEE DETAIL 7/S-203-2.



FAN FLOOR FRAMING PLAN - PHASE 2
SCALE : 1/8" = 1'-0"

A
S-103B-2

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 2019
ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

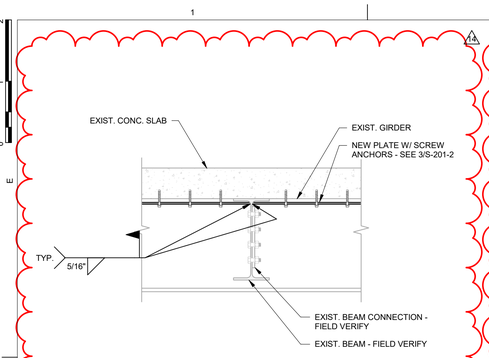
PROFESSIONAL STRUCTURAL ENGINEER
11/17/22
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
2	1/5/21	ADDENDUM 3
8	5/21/21	PR #5
11	8/17/21	PR #8
14	5/16/22	ADDENDUM #1

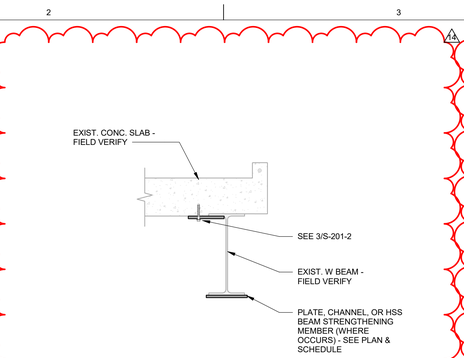
PROJECT NUMBER 18923

FAN FLOOR FRAMING PLAN - PHASE 2

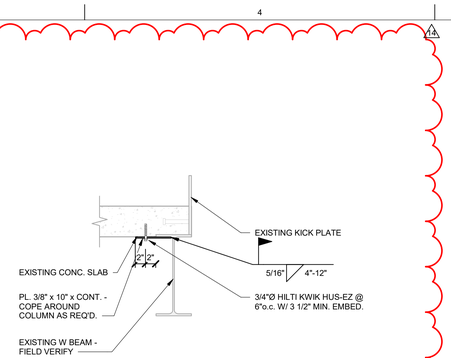
S-103B-2



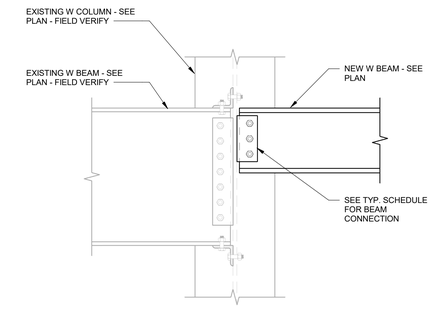
DETAIL 1 S-201-2 L
SCALE : NONE



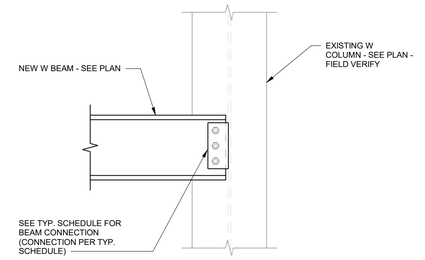
DETAIL 2 S-201-2 L
SCALE : NONE



DETAIL 3 S-201-2 L
SCALE : NONE

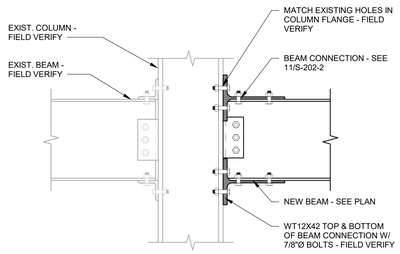


DETAIL 4 S-201-2
SCALE : NONE

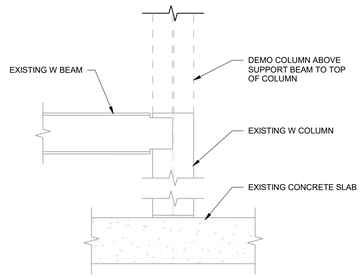


DETAIL 5 S-201-2
SCALE : NONE

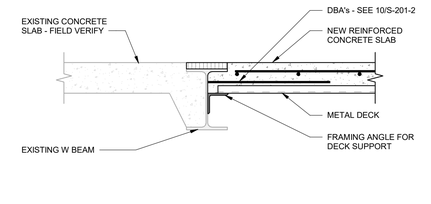
CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 2 OF THIS PROJECT. MATERIAL FOR CLOUDED AREAS HAS ALREADY BEEN PURCHASED AND IS CURRENTLY ON-SITE (FIELD VERIFY). CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.



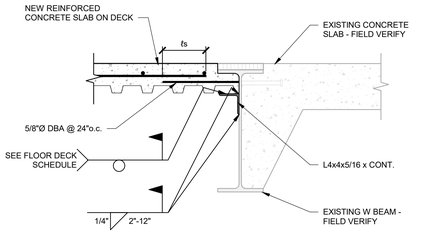
DETAIL 6 S-201-2 L
SCALE : NONE



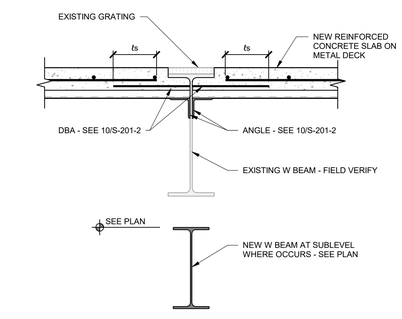
DETAIL 8 S-201-2
SCALE : NONE



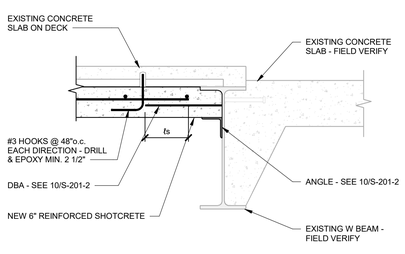
DETAIL 9 S-201-2 L
SCALE : NONE



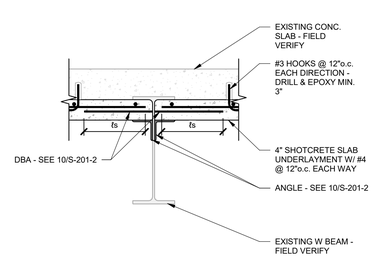
DETAIL 10 S-201-2 L
SCALE : NONE



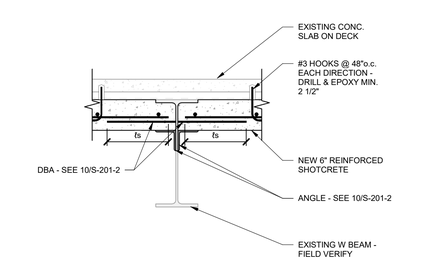
DETAIL 11 S-201-2 L
SCALE : NONE



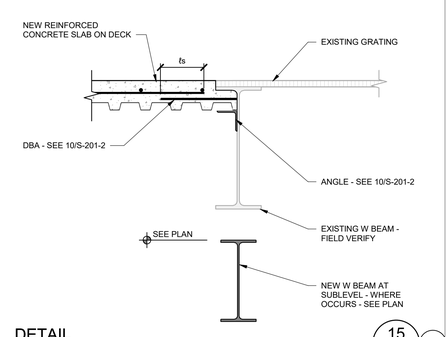
DETAIL 12 S-201-2 L
SCALE : NONE



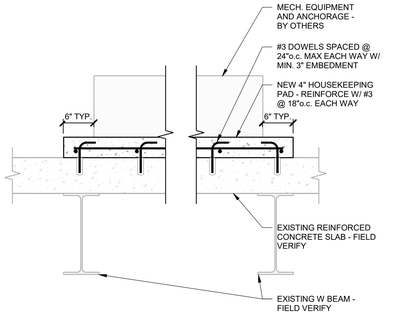
DETAIL 13 S-201-2 L
SCALE : NONE



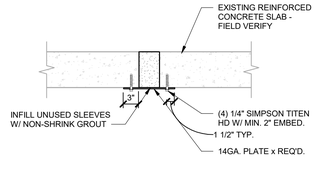
DETAIL 14 S-201-2 L
SCALE : NONE



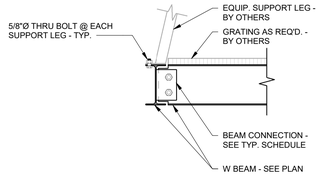
DETAIL 15 S-201-2 L
SCALE : NONE



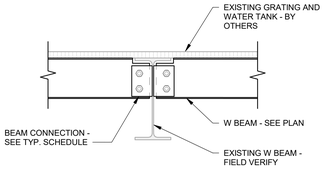
DETAIL 16 S-201-2
SCALE : NONE



DETAIL 17 S-201-2
SCALE : NONE



DETAIL 18 S-201-2
SCALE : NONE



DETAIL 19 S-201-2
SCALE : NONE

FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
O 801.521.6186 • FFKR.COM

50 Years 1969 2019 ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

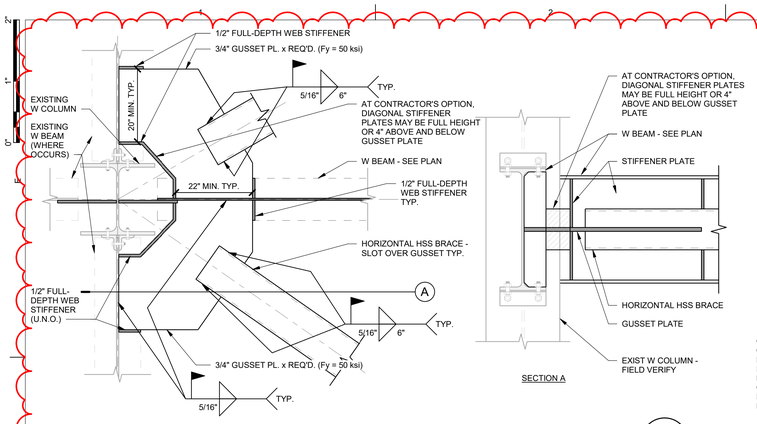
1/17/22 No. 276196 Robert M. Moyle PROFESSIONAL STRUCTURAL ENGINEER STATE OF UTAH

△	DATE	REVISION
2	1/5/21	ADDENDUM 3
8	5/21/21	PR #5
11	8/17/21	PR #8
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18923

PHASE 2 DETAILS

S-201-2

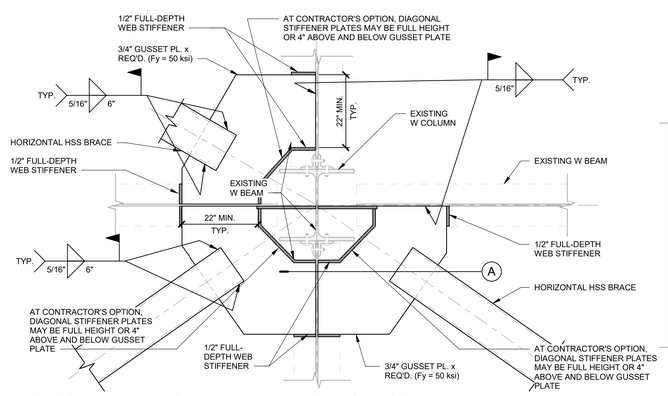


GUSSET PLATE INSTALLED MID-WEB OF BEAM

SCALE : NONE

1 S-203-2 L

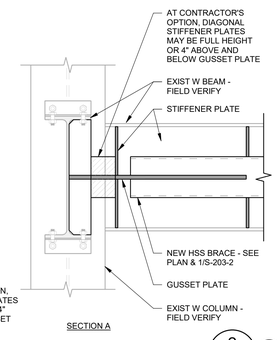
CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 2 OF THIS PROJECT. MATERIAL FOR CLOUDED AREAS HAS ALREADY BEEN PURCHASED AND IS CURRENTLY ON-SITE (FIELD VERIFY). CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.



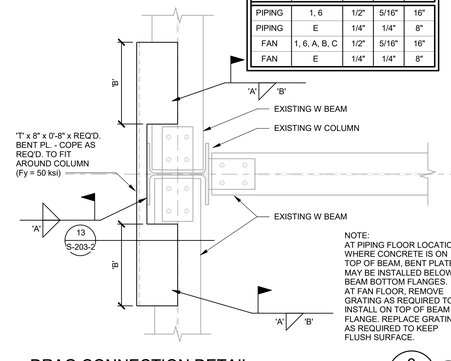
GUSSET PLATE INSTALLED MID-HEIGHT OF HSS

SCALE : NONE

2 S-203-2 L



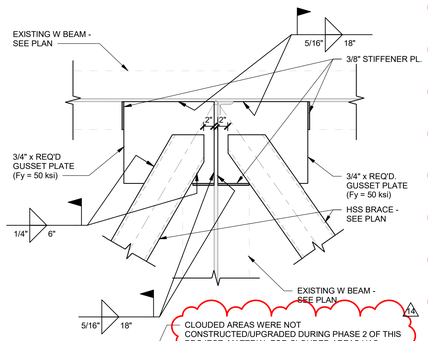
FLOOR	GRID	'T'	WELD	
			'A'	'B'
PIPING	1, 6	1/2"	5/16"	16"
PIPING	E	1/4"	1/4"	8"
FAN	1, 6, A, B, C	1/2"	5/16"	16"
FAN	E	1/4"	1/4"	8"



DRAG CONNECTION DETAIL

SCALE : NONE

3 S-203-2 L

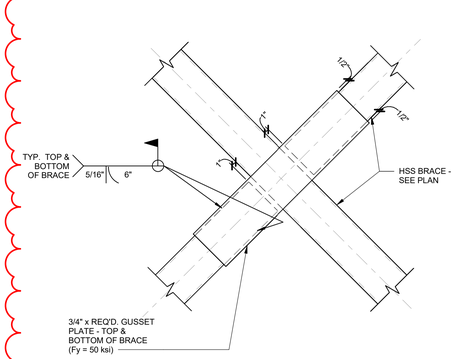


CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 2 OF THIS PROJECT. MATERIAL FOR CLOUDED AREAS HAS ALREADY BEEN PURCHASED AND IS CURRENTLY ON-SITE (FIELD VERIFY). CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.

DETAIL

SCALE : NONE

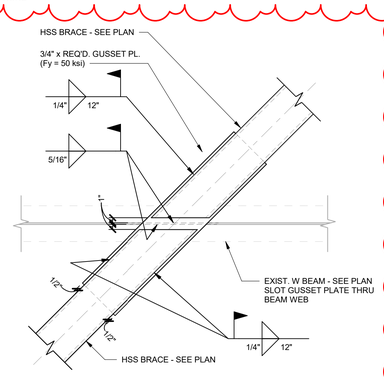
4 S-203-2 L



DETAIL

SCALE : NONE

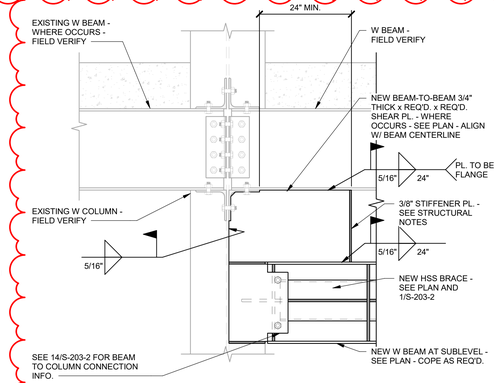
5 S-203-2 L



DETAIL

SCALE : NONE

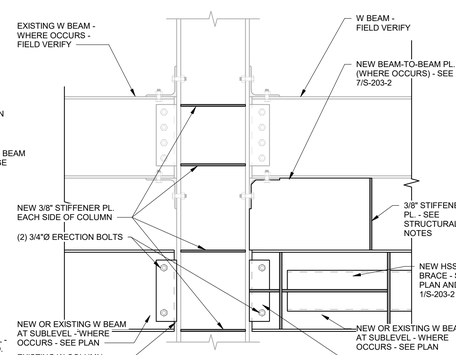
6 S-203-2 L



DETAIL

SCALE : NONE

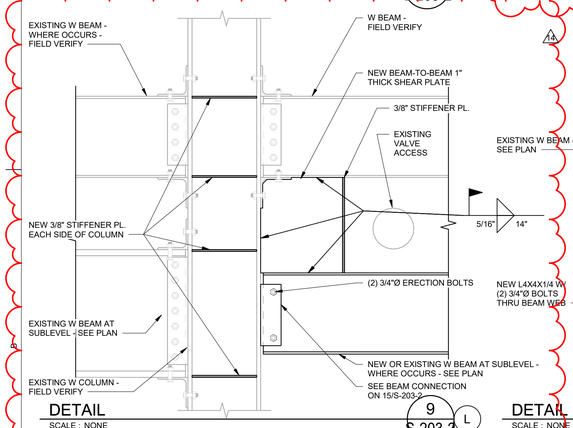
7 S-203-2 L



DETAIL

SCALE : NONE

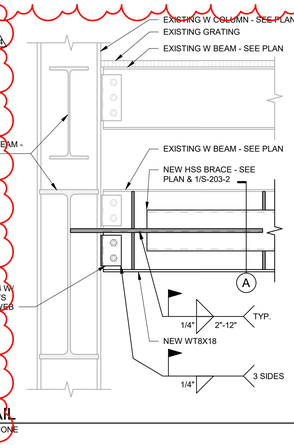
8 S-203-2 L



DETAIL

SCALE : NONE

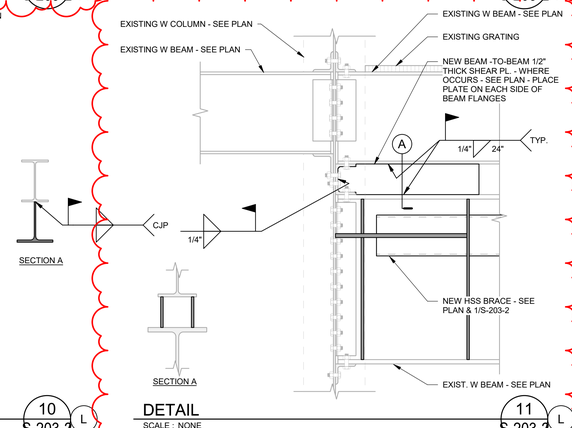
9 S-203-2 L



DETAIL

SCALE : NONE

10 S-203-2 L



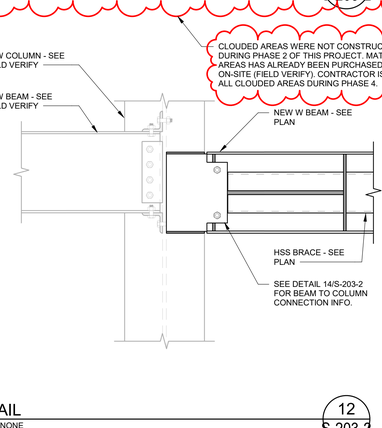
DETAIL

SCALE : NONE

11 S-203-2 L

CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 2 OF THIS PROJECT. MATERIAL FOR CLOUDED AREAS HAS ALREADY BEEN PURCHASED AND IS CURRENTLY ON-SITE (FIELD VERIFY). CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.

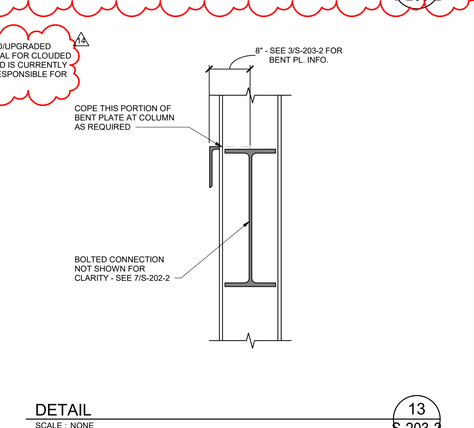
CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 2 OF THIS PROJECT. MATERIAL FOR CLOUDED AREAS HAS ALREADY BEEN PURCHASED AND IS CURRENTLY ON-SITE (FIELD VERIFY). CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.



DETAIL

SCALE : NONE

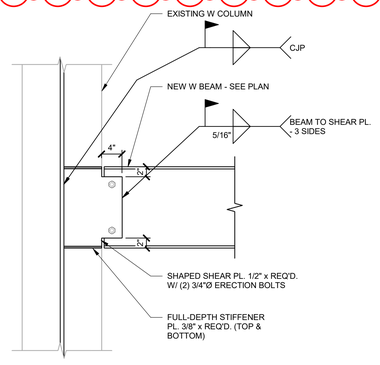
12 S-203-2



DETAIL

SCALE : NONE

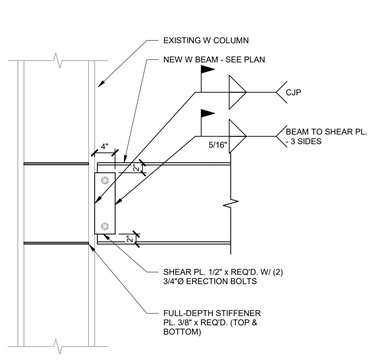
13 S-203-2



DETAIL

SCALE : NONE

14 S-203-2



DETAIL

SCALE : NONE

15 S-203-2

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM
50 YEARS 1969 2019
ENGINEERS
structural consultants
1394 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

PROFESSIONAL STRUCTURAL ENGINEER
1/17/22
No. 276196
Robert M. Moyle
STATE OF UTAH

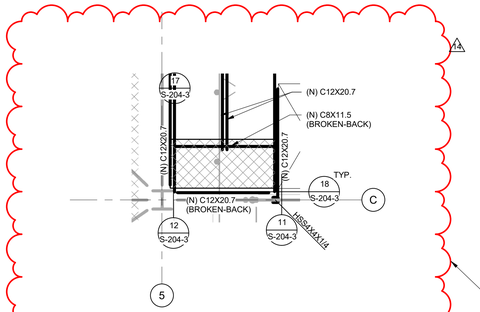
△	DATE	REVISION
1	5/18/20	REVIEW COMMENTS #1
2	1/5/21	ADDENDUM 3
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18923

PHASE 2 DETAILS

S-203-2

5/16/2022 10:44:18 AM



STAIR LANDING FRAMING PLAN

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

B
S-102-3

14

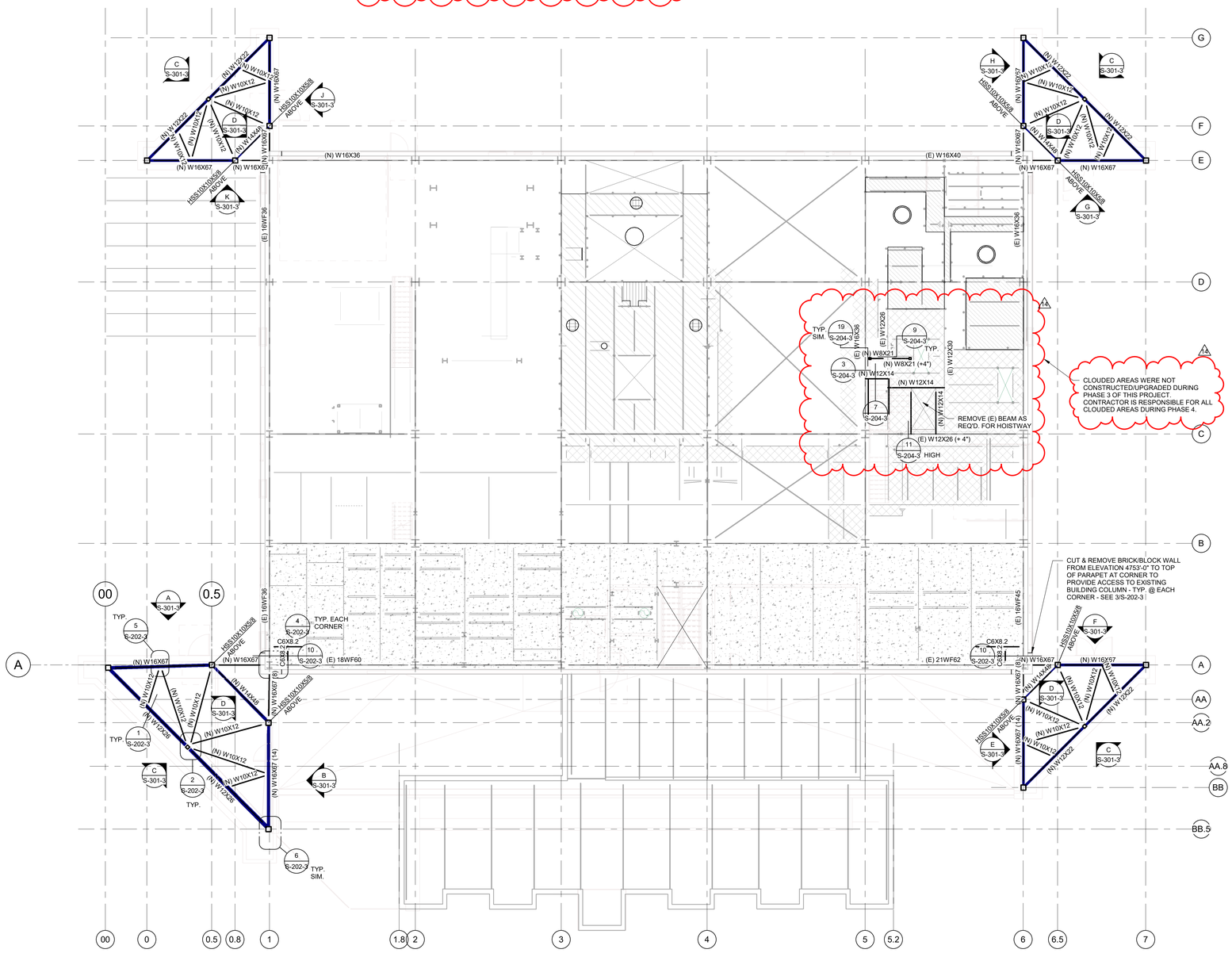
CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 3 OF THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.

PIPING FLOOR FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL IS 4756' - 6 3/4" U.N.O. (FIELD VERIFY) - FINISHED FLOOR ELEVATION IS 4757' - 0" (FIELD VERIFY)
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. = EXISTING GRATING
4. = EXISTING SUSPENDED CONCRETE SLAB
5. = NEW GRATING

FLOOR FRAMING NOTES:

1. SEE SHEET SG-001 FOR GENERAL STRUCTURAL NOTES
2. SEE TYPICAL BEAM CONNECTION SCHEDULE FOR TYPICAL W BEAM CONNECTIONS THAT ARE NOT SPECIFICALLY DETAILED.
3. SEE 10/S-202-3 FOR FRAMING AROUND SUSPENDED CONCRETE SLAB OPENINGS IN EXISTING SUSPENDED SLABS. STEEL FRAMING TO BE INSTALLED PRIOR TO REMOVAL OF CONCRETE.



PIPING FLOOR FRAMING PLAN / OFFICE ROOF FRAMING PLAN - PHASE 3

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

A
S-102-3

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 2019
ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

PROFESSIONAL STRUCTURAL ENGINEER
1/17/22
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4
6	4/15/21	PR #3
14	5/16/22	ADDENDUM #1

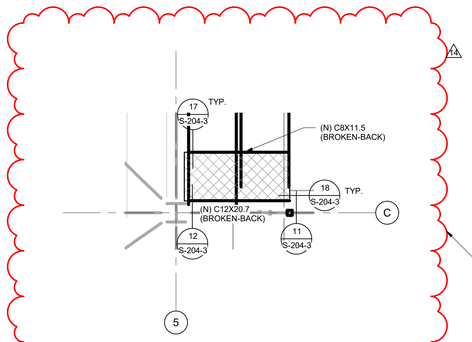
PROJECT NUMBER 18923

PIPING FLOOR PLAN - PHASE 3

S-102-3

FAN FLOOR FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL IS 4771' - 10 3/4" U.N.O. (FIELD VERIFY) - FINISHED FLOOR ELEVATION IS 4772' - 0" (FIELD VERIFY)
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. = EXISTING GRATING
4. = EXISTING SUSPENDED CONCRETE SLAB
5. SEE S-102-3 FOR ADDITIONAL NOTES.

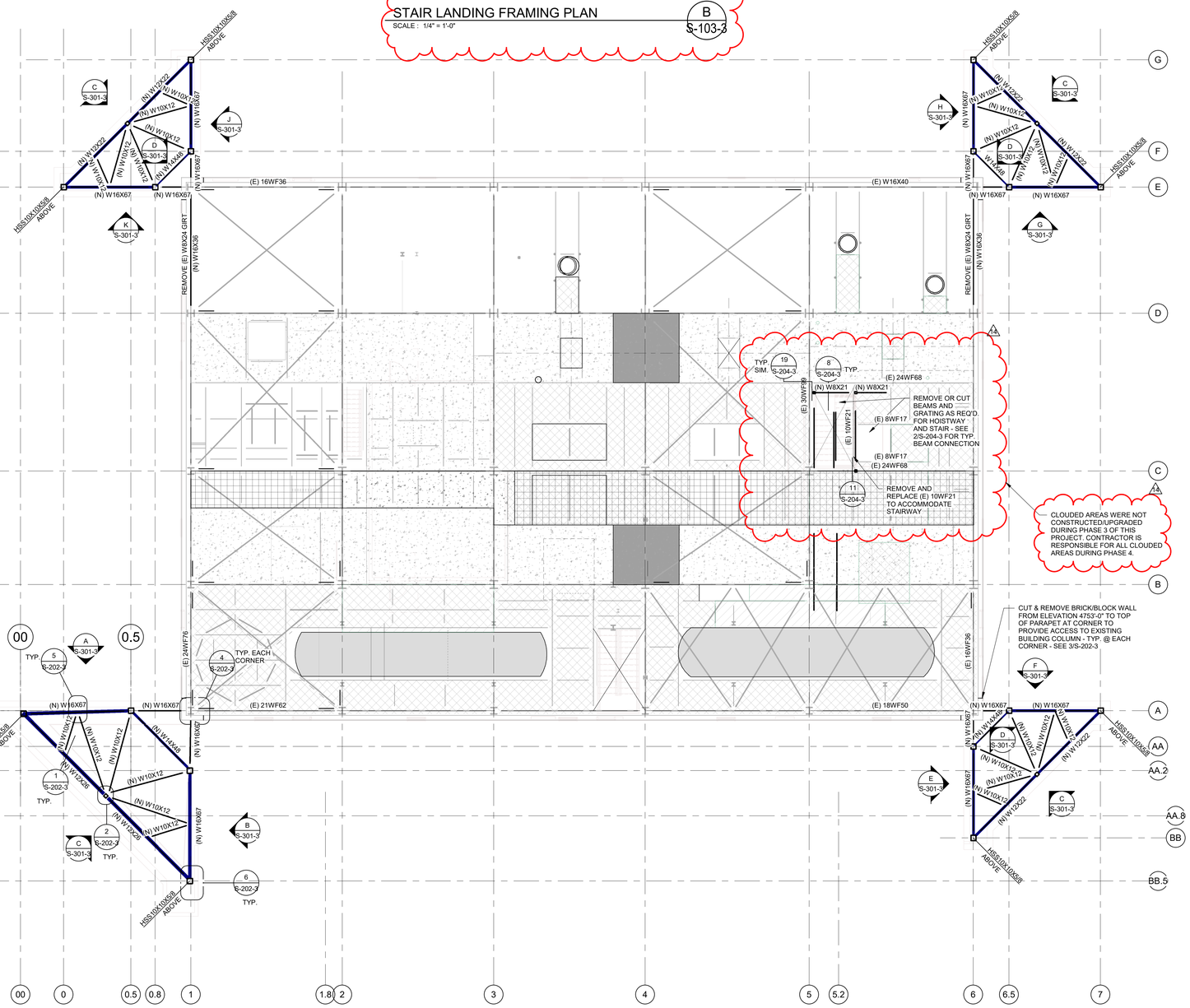


14

CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 3 OF THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.

STAIR LANDING FRAMING PLAN
SCALE : 1/4" = 1'-0"

B
S-103-3



FAN FLOOR FRAMING PLAN
SCALE : 1/8" = 1'-0"

A
S-103-3

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 2019
ENGINEERS
structural consultants
1984 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4
SALT LAKE CITY UTAH
PERMIT SET - 1-17-2022

PROFESSIONAL STRUCTURAL ENGINEER
1/17/22
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4
6	4/15/21	PR #3
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18923

FAN FLOOR FRAMING PLAN - PHASE 3

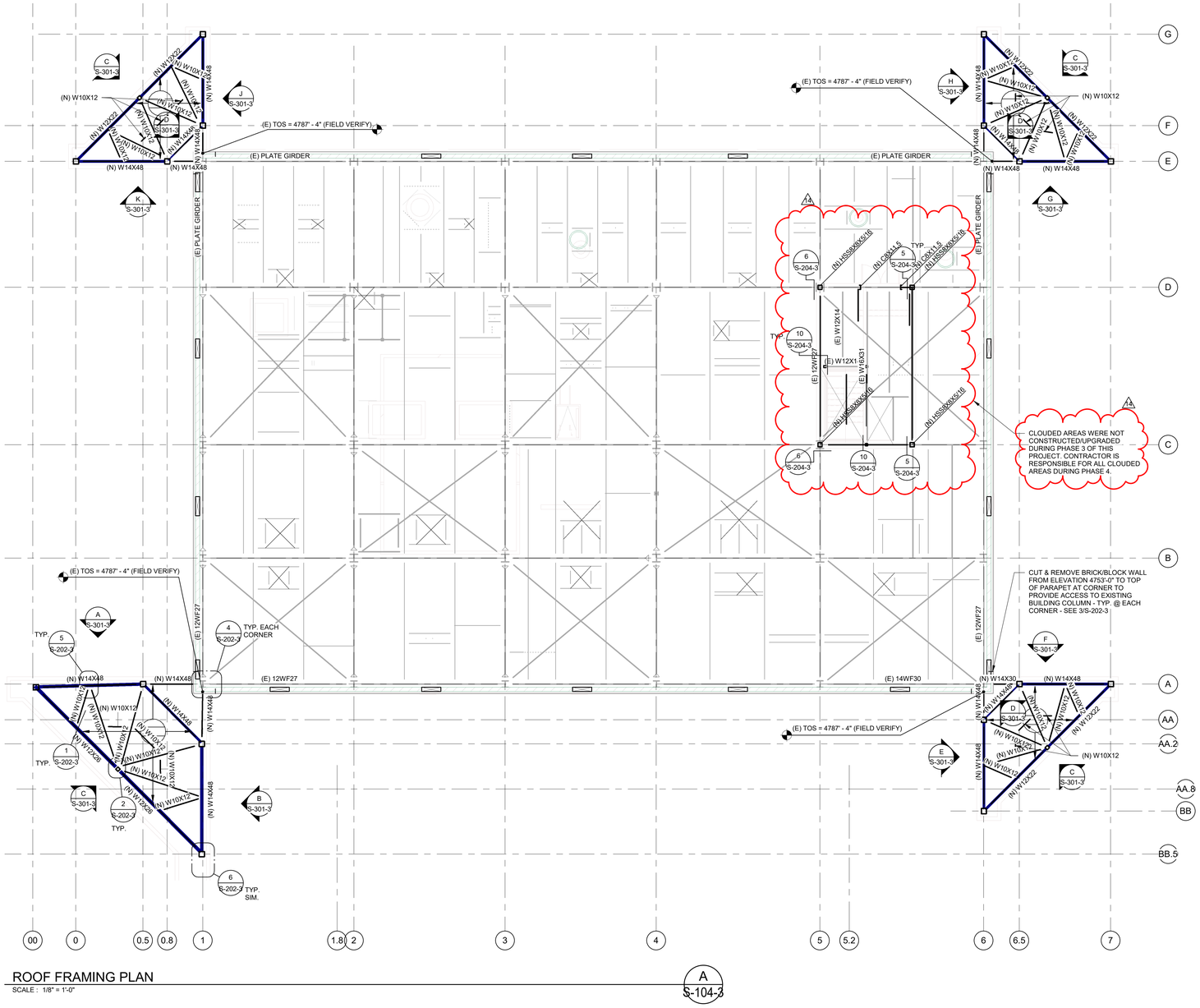
S-103-3

ROOF FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL VARIES - FIELD VERIFY.
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL

ROOF FRAMING NOTES:

1. SEE SHEET SG-001 FOR GENERAL STRUCTURAL NOTES.
2. SEE ROOF DECK SCHEDULE FOR REQUIRED DECK AND ATTACHMENTS.
3. CONTRACTOR SHALL ERECT AND MAINTAIN ADEQUATE TEMPORARY BRACING UNTIL ALL ROOF FRAMING AND DECK ATTACHMENTS ARE COMPLETE.
4. SEE TYPICAL BEAM CONNECTION SCHEDULE FOR TYPICAL W BEAM CONNECTIONS THAT ARE NOT SPECIFICALLY DETAILED.



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

A
S-104-3

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 2019 ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4
SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

PROFESSIONAL STRUCTURAL ENGINEER
1/17/22
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18923

ROOF FRAMING PLAN - PHASE 3

S-104-3

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

A R W STRUCTURAL ENGINEERS
50 Years 1969 - 2019
structural consultants
1594 W. Park Cir. Bluffdale, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

PROFESSIONAL STRUCTURAL ENGINEER — STATE OF UTAH — Robert M. Moyle No. 276196 — 1/17/22

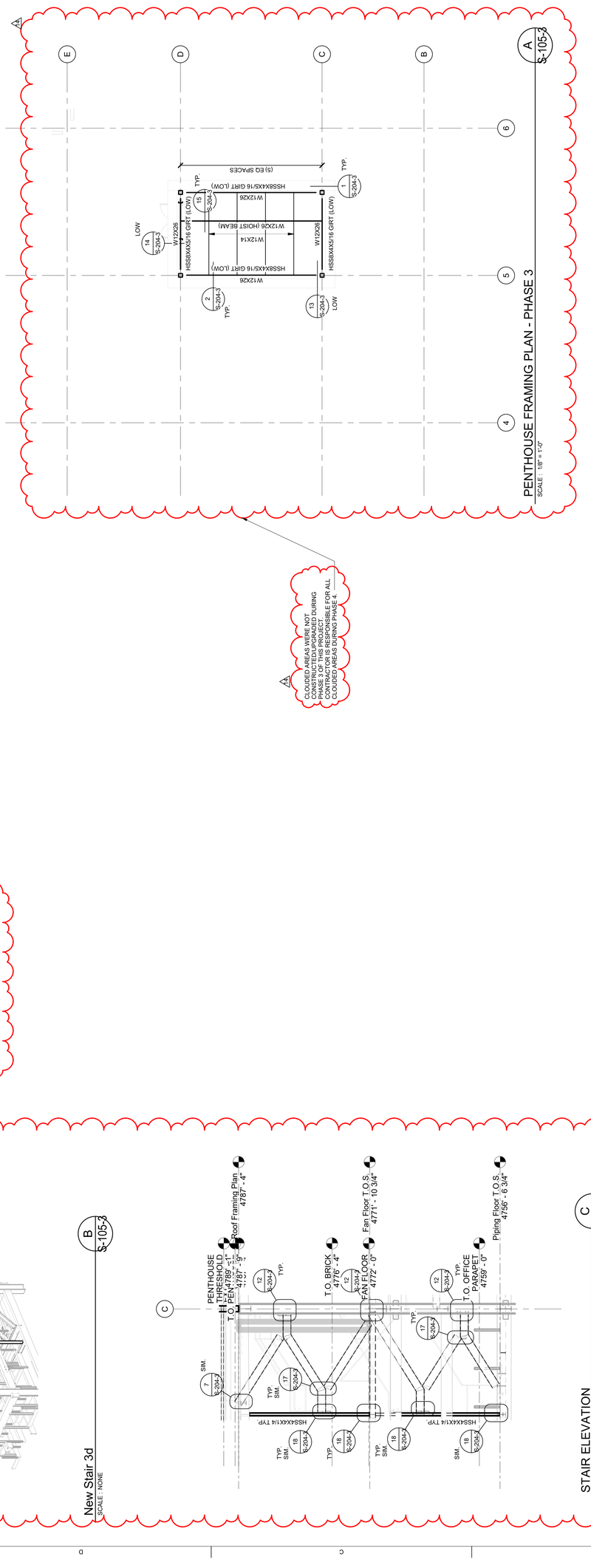
	DATE	REVISION
5	5/10/21	PR #4
14	8/16/22	ADDENDUM #1

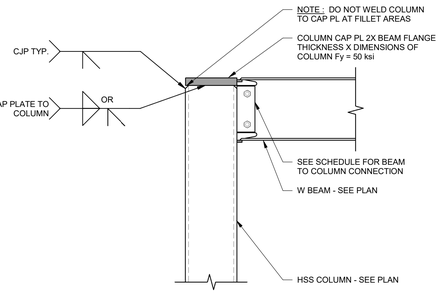
PROJECT NUMBER 18923

PENTHOUSE FRAMING & STAIR ELEVATIONS - PHASE 3

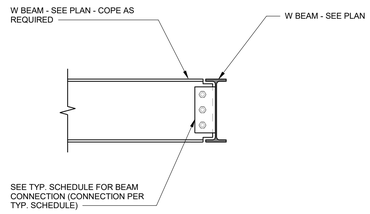
S-105-3

NORTH

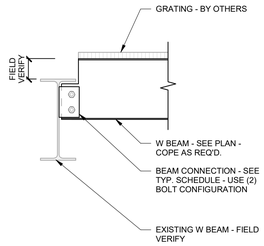




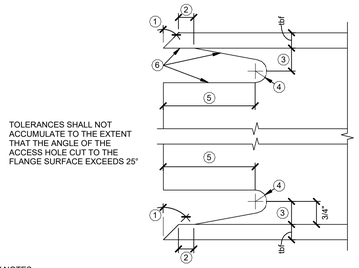
MOMENT FRAME CONNECTION DETAIL — 1 / S-204-3
SCALE : NONE



DETAIL — 2 / S-204-3
SCALE : NONE



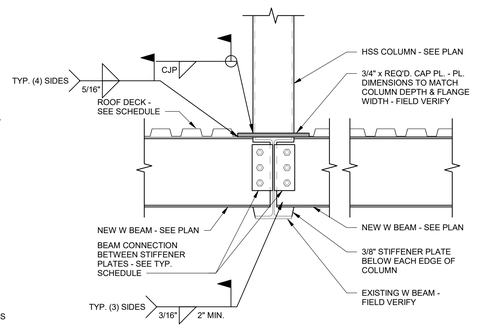
DETAIL — 3 / S-204-3
SCALE : NONE



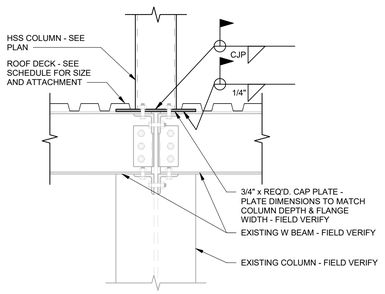
KEY NOTES :

1. BEVEL AS REQUIRED BY AWS D1.1 FOR SELECTED GROOVE WELD PROCEDURE.
2. LARGER OF t_{bf} OR 1/2 INCH. (PLUS 1/2 t_{bf}, OR MINUS 1/4 t_{bf}).
3. 3/4 t_{bf} TO t_{bf}, 3/4" MINIMUM (+/- 1/4 INCH).
4. 3/8" MINIMUM RADIUS (PLUS NOT LIMITED, OR MINUS 0).
5. 3 t_{bf}, (+/- 1/2 INCH).
6. SEE FEMA-353, RECOMMENDED SPECIFICATIONS AND QUALITY ASSURANCE GUIDELINES FOR STEEL MOMENT-FRAME CONSTRUCTION FOR SEISMIC APPLICATIONS, FOR FABRICATION DETAILS INCLUDING CUTTING METHODS AND SMOOTHNESS REQUIREMENTS.

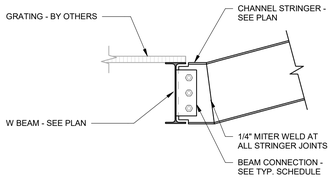
DETAIL — 4 / S-204-3
SCALE : NONE



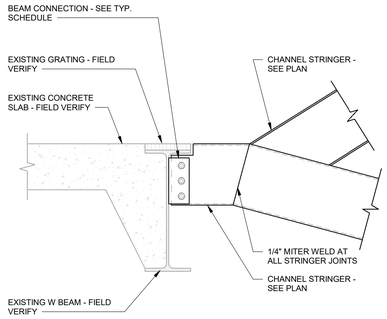
DETAIL — 5 / S-204-3
SCALE : NONE



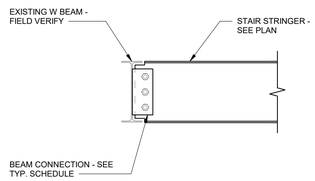
DETAIL — 6 / S-204-3
SCALE : NONE



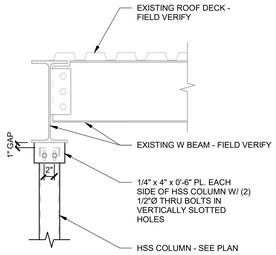
DETAIL — 7 / S-204-3
SCALE : NONE



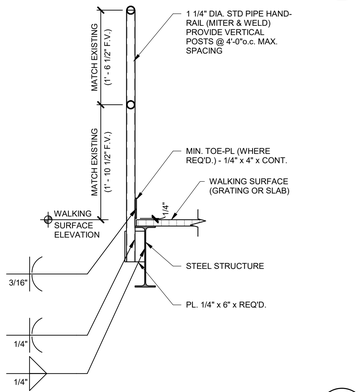
DETAIL — 8 / S-204-3
SCALE : NONE



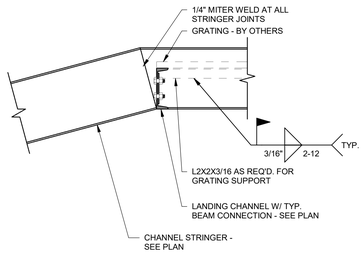
DETAIL — 9 / S-204-3
SCALE : NONE



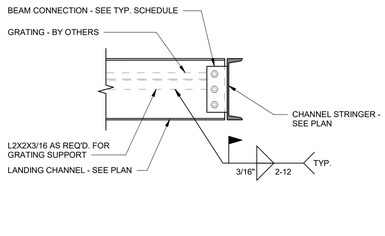
DETAIL — 10 / S-204-3
SCALE : NONE



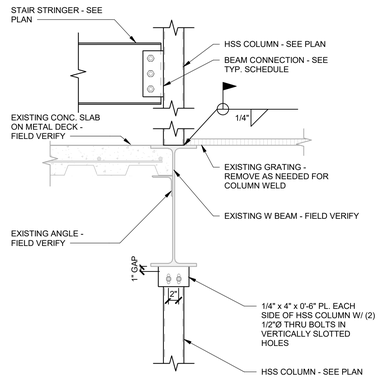
TYPICAL HANDRAIL CONFIGURATION — 16 / S-204-3
SCALE : NONE



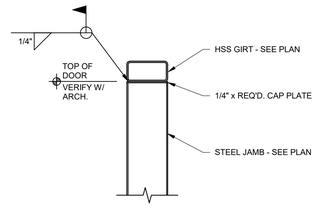
DETAIL — 17 / S-204-3
SCALE : NONE

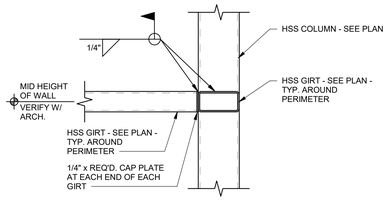


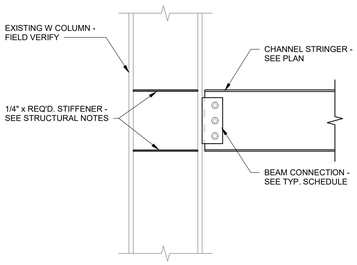
DETAIL — 18 / S-204-3
SCALE : NONE

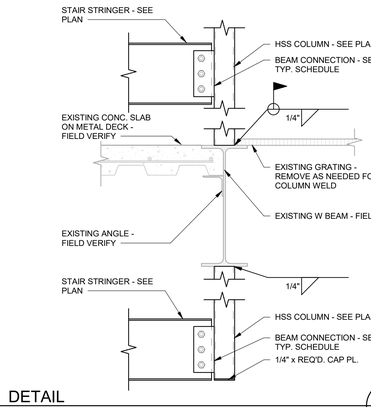


DETAIL — 19 / S-204-3
SCALE : NONE







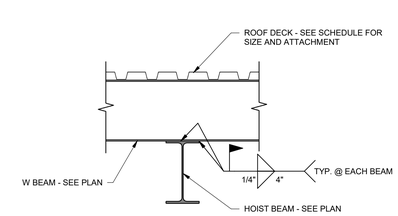


DETAIL — 11 / S-204-3
SCALE : NONE

DETAIL — 12 / S-204-3
SCALE : NONE

DETAIL — 13 / S-204-3
SCALE : NONE

DETAIL — 14 / S-204-3
SCALE : NONE



DETAIL — 15 / S-204-3
SCALE : NONE

CLOUDED AREAS WERE NOT CONSTRUCTED/UPGRADED DURING PHASE 3 OF THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR ALL CLOUDED AREAS DURING PHASE 4.
1A

FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
O 801.521.6186 • FFKR.COM
50 Years 1969 2019 ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22508 -PHASE 4

SALT LAKE CITY UTAH

PERMIT SET - 1-17-2022

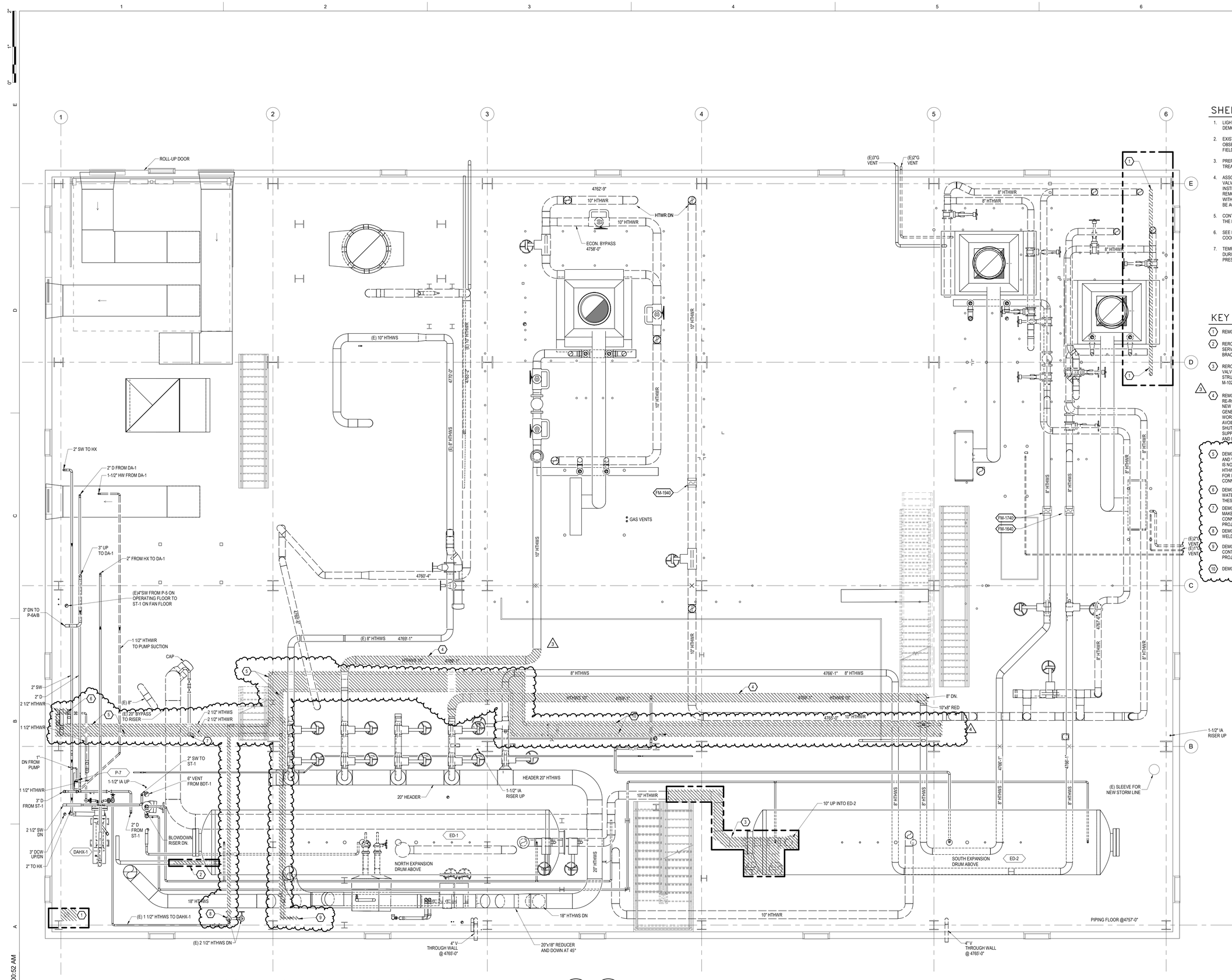
PROFESSIONAL STRUCTURAL ENGINEER — 11/7/22 — No. 276196 — Robert M. Moyle — STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4
14	5/16/22	ADDENDUM #1

PROJECT NUMBER 18923

PHASE 3 DETAILS

S-204-3



SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HATCHING INDICATES DEMOLITION.
2. EXISTING CONDITIONS ARE TAKEN FROM EXISTING DRAWINGS AND FIELD OBSERVATION. ACTUAL CONDITIONS MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY ALL CONDITIONS PRIOR TO COMMENCING WORK.
3. PREPARE SYSTEM FOR DEMOLITION BY DRAINING AND DISPOSING OF TREATED WATER PROPERLY.
4. ASSOCIATED ITEMS FOR REMOVAL INCLUDE PIPE, INSULATION, LAGGING, VALVES, PIPE SUPPORTS, PNEUMATIC AND ELECTRIC CONTROL DEVICES, INSTRUMENTATION, ASSOCIATED CONTROL WIRING AND TUBING. REMOVE PNEUMATIC TUBE BACK TO BRANCH CONNECTION AND CAP WITH AIR TIGHT SEAL (CRIMPING OR BENDING OVER THE TUBE WILL NOT BE ACCEPTED).
5. CONTRACTOR SHALL TRACE EACH LINE PRIOR TO REMOVAL TO VERIFY THE LINE SHOULD BE REMOVED.
6. SEE ELECTRICAL, STRUCTURAL AND ARCHITECTURAL DRAWINGS FOR COORDINATION.
7. TEMPORARILY COVER ALL OPEN PIPE ENDS TO AVOID CONTAMINATION DURING CONSTRUCTION. PROVIDE CAP OR BLIND-FLANGE FOR PRESSURIZED PIPE SYSTEMS.

KEY NOTES

1. REMOVE 6" ST PIPE.
2. REROUTE 2" MANUAL BYPASS VALVE ABOVE MAKE-UP CONTROL VALVE SERVING ED-1 AS REQUIRED TO CLEAR NEW STRUCTURAL CROSS BRACING.
3. REROUTE SECTION OF 10" LIQUID EQUALIZER PIPE AND ASSOCIATED VALVES BETWEEN ED-1 AND ED-2 AS REQUIRED TO MAKE ROOM FOR NEW STRUCTURAL BEAMS. REINSTALL THE PIPE AT LOWER ELEVEATION. SEE M-102-2.
4. REMOVE INDICATED SECTIONS OF HTWS PIPING. PIPING TO BE RE-ROUTED AROUND NEW STRUCTURAL ELEMENTS. SEE M-102-2 FOR NEW ROUTES. WORK SHOWN WILL REQUIRE SHUTDOWN OF HTHW GENERATOR 7 AND GENERATOR 9. GENERATOR 7 AND GENERATOR 9 WORK SHALL NOT OCCUR SIMULTANEOUSLY BUT ONE AT A TIME TO AVOID SHUTDOWNS OF BOTH GENERATORS CONCURRENTLY. SHUTDOWNS TO BE COORDINATED WITH OWNER. EXISTING PIPE SUPPORTS ALONG REMOVED SECTIONS OF PIPING SHALL BE RELOCATED AND REUSED FOR NEW PIPING.
5. DEMOLISH HTHW SUPPLY AND RETURN PIPING, INSULATION, HANGERS, AND VALVES AS SHOWN. DEMOLITION CAN BEGIN ONCE OFFICE HEATING IS NOT LONGER NEEDED AND MAKEUP WATER PROJECT HAS MADE NEW HTHWR TIE IN. THE MAKEUP WATER PROJECT SHALL BE RESPONSIBLE FOR ISOLATION AND DRAIN DOWN OF PIPING AS PART OF OUTAGE TO CONNECT NEW PROVIDED BY THAT PROJECT.
6. DEMOLISH PIPING UP TO ISOLATION VALVES AT THIS LOCATION. MAKEUP WATER PROJECT WILL CONNECT ON THE HEAT EXCHANGER SIDE OF THESE VALVES.
7. DEMOLISH TEE AND OVERHEAD PIPING. DEMOLISH RISER DOWN TO MAKEUP WATER PROJECT CONNECTION POINT. PIPING WILL NOT BE CONNECTED TO ACTIVE HTHWR PIPING USED IN MAKEUP WATER PROJECT.
8. DEMOLISH PIPING DOWN TO EXISTING 2ND ISOLATION VALVE. PROVIDE WELDED CAP ABOVE EXISTING ISOLATION VALVE.
9. DEMOLISH EXISTING PIPING DOWN TO FLOOR BELOW. DEMOLISH CONTINUES ON PHASE 4 DRAWINGS. PATCH FLOOR PER GENERAL PROJECT REQUIREMENTS.
10. DEMOLISH DEAD END HTHW PIPING AS SHOWN.

1 PIPING FLOOR - MECHANICAL DEMOLITION PLAN
SCALE: 1/4" = 1'-0"

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

PLAN NORTH TRUE NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering + green future
MECHANICAL · ELECTRICAL
INDUSTRIAL · SUSTAINABLE DESIGN
12500 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
RMH Group project number

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22377 - PHASE 2 CD
SALT LAKE CITY UTAH

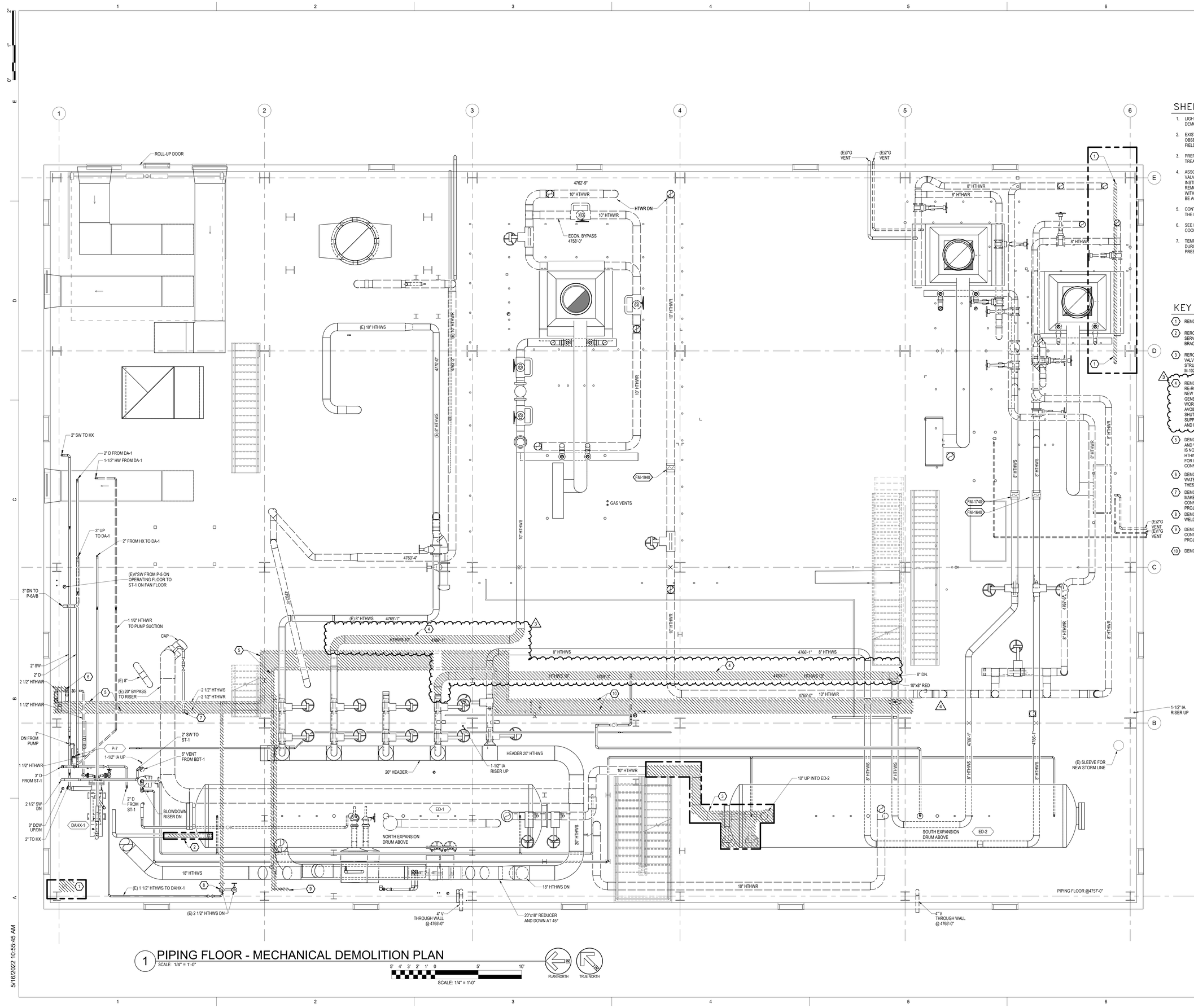
100% CD 01-17-2022

	DATE	REVISION
1	9-23-21	PR-X HTHW REROUTE
2	1-5-22	PH2 PR#12

PROJECT NUMBER 18136

PIPING FLOOR - MECHANICAL DEMOLITION PLAN

MD-102-2



SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HATCHING INDICATES DEMOLITION.
2. EXISTING CONDITIONS ARE TAKEN FROM EXISTING DRAWINGS AND FIELD OBSERVATION. ACTUAL CONDITIONS MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY ALL CONDITIONS PRIOR TO COMMENCING WORK.
3. PREPARE SYSTEM FOR DEMOLITION BY DRAINING AND DISPOSING OF TREATED WATER PROPERLY.
4. ASSOCIATED ITEMS FOR REMOVAL INCLUDE PIPE, INSULATION, LAGGING, VALVES, PIPE SUPPORTS, PNEUMATIC AND ELECTRIC CONTROL DEVICES, INSTRUMENTATION, ASSOCIATED CONTROL WIRING AND TUBING. REMOVE PNEUMATIC TUBE BACK TO BRANCH CONNECTION AND CAP WITH AIR TIGHT SEAL (CRIMPING OR BENDING OVER THE TUBE WILL NOT BE ACCEPTED).
5. CONTRACTOR SHALL TRACE EACH LINE PRIOR TO REMOVAL TO VERIFY THE LINE SHOULD BE REMOVED.
6. SEE ELECTRICAL, STRUCTURAL AND ARCHITECTURAL DRAWINGS FOR COORDINATION.
7. TEMPORARILY COVER ALL OPEN PIPE ENDS TO AVOID CONTAMINATION DURING CONSTRUCTION. PROVIDE CAP OR BLIND-FLANGE FOR PRESSURIZED PIPE SYSTEMS.

KEY NOTES

1. REMOVE 6" ST PIPE.
2. REROUTE 2" MANUAL BYPASS VALVE ABOVE MAKE-UP CONTROL VALVE SERVING ED-1 AS REQUIRED TO CLEAR NEW STRUCTURAL CROSS BRACING.
3. REROUTE SECTION OF 10" LIQUID EQUALIZER PIPE AND ASSOCIATED VALVES BETWEEN ED-1 AND ED-2 AS REQUIRED TO MAKE ROOM FOR NEW STRUCTURAL BEAMS. REINSTALL THE PIPE AT LOWER ELEVEATION. SEE M-102-2.
4. REMOVE INDICATED SECTIONS OF HTWS PIPING. PIPING TO BE RE-ROUTED AROUND NEW STRUCTURAL ELEMENTS. SEE M-102-2 FOR NEW ROUTES. WORK SHOWN WILL REQUIRE SHUTDOWN OF HTHW GENERATOR 7 AND GENERATOR 9. GENERATOR 7 AND GENERATOR 9 WORK SHALL NOT OCCUR SIMULTANEOUSLY BUT ONE AT A TIME TO AVOID SHUTDOWNS OF BOTH GENERATORS CONCURRENTLY. SHUTDOWNS TO BE COORDINATED WITH OWNER. EXISTING PIPE SUPPORTS ALONG REMOVED SECTIONS OF PIPING SHALL BE RELOCATED AND REUSED FOR NEW PIPING.
5. DEMOLISH HTHW SUPPLY AND RETURN PIPING, INSULATION, HANGERS, AND VALVES AS SHOWN. DEMOLITION CAN BEGIN ONCE OFFICE HEATING IS NOT LONGER NEEDED AND MAKEUP WATER PROJECT HAS MADE NEW HTHWR TIE IN. THE MAKEUP WATER PROJECT SHALL BE RESPONSIBLE FOR ISOLATION AND DRAIN DOWN OF PIPING AS PART OF OUTAGE TO CONNECT NEW PROVIDED BY THAT PROJECT.
6. DEMOLISH PIPING UP TO ISOLATION VALVES AT THIS LOCATION. MAKEUP WATER PROJECT WILL CONNECT ON THE HEAT EXCHANGER SIDE OF THESE VALVES.
7. DEMOLISH TEE AND OVERHEAD PIPING. DEMOLISH RISER DOWN TO MAKEUP WATER PROJECT CONNECTION POINT. PIPING WILL NOT BE CONNECTED TO ACTIVE HTHWR PIPING USED IN MAKEUP WATER PROJECT.
8. DEMOLISH PIPING DOWN TO EXISTING 2ND ISOLATION VALVE, PROVIDE WELDED CAP ABOVE EXISTING ISOLATION VALVE.
9. DEMOLISH EXISTING PIPING DOWN TO FLOOR BELOW. DEMOLISH CONTINUES ON PHASE 4 DRAWINGS. PATCH FLOOR PER GENERAL PROJECT REQUIREMENTS.
10. DEMOLISH DEAD END HTHW PIPING AS SHOWN.

1 PIPING FLOOR - MECHANICAL DEMOLITION PLAN

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

5' 4' 3' 2' 1' 0 5' 10'

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

PLAN NORTH TRUE NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering + green future
MECHANICAL · ELECTRICAL
INDUSTRIAL + SUSTAINABLE DESIGN
12500 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
RMH Group project number

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22377 - PHASE 2 CD

SALT LAKE CITY UTAH

100% CD 01-17-2022

	DATE	REVISION
1	9-23-21	PR-X HTHW REROUTE
2	1-5-22	PH2 PR#12

PROJECT NUMBER 18136

PIPING FLOOR - MECHANICAL DEMOLITION PLAN

MD-102-2

SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. EXISTING CONDITIONS ARE TAKEN FROM EXISTING DRAWINGS AND FIELD OBSERVATION. ACTUAL CONDITIONS MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY ALL CONDITIONS PRIOR TO COMMENCING WORK.

KEY NOTES

1. ROUTE NEW STORM LINE THROUGH OPEN FLOOR AREA TO FLOOR BELOW. OFFSET AS REQUIRED TO AVOID NEW STRUCTURAL BEAMS.
2. ROUTE NEW OVERFLOW STORM LINE THROUGH (E) 14" SLEEVE TO FLOOR BELOW. OFFSET AS REQUIRED TO AVOID NEW STRUCTURAL BEAMS.
3. LOWER SECTION OF 10" HTWR LIQUID EQUALIZER PIPE AND ASSOCIATED VALVES BETWEEN ED-1 AND ED-2 AS NECESSARY TO AVOID CONFLICT WITH NEW STRUCTURAL BEAMS.
4. REROUTE MANUAL BYPASS VALVE ABOVE CONTROL VALVE AS REQUIRED TO CLEAR NEW STRUCTURAL BEAMS.
5. NEW 3/4" HTHW VENT PIPE. SEE SHEETS M-101-2 AND M-103-2 FOR CONTINUATION ABOVE AND BELOW.
6. INSTALL NEW HTHWS PIPING WITH EXISTING SUPPORTS AND EXTEND SUPPORTS AS NEEDED. SUPPORTS SHALL BE INSTALLED IN APPROXIMATELY THE SAME LOCATIONS NORTH/SOUTH ALONG THE PIPES. WORK SHOWN WILL REQUIRE SHUTDOWN OF HTHW GENERATOR 7 AND GENERATOR 9. GENERATOR 7 AND GENERATOR 9 WORK SHALL NOT OCCUR SIMULTANEOUSLY BUT ONE AT A TIME TO AVOID SHUTDOWNS OF BOTH GENERATORS CONCURRENTLY. SHUTDOWNS TO BE COORDINATED WITH OWNER.

1 PIPING FLOOR - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

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

PLAN NORTH TRUE NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering + green nature
MECHANICAL · ELECTRICAL
INDUSTRIAL · SUSTAINABLE DESIGN
12500 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
RMH Group project number

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22377 - PHASE 2 CD

SALT LAKE CITY UTAH

100% CD 01-17-2022

	DATE	REVISION
1	8-10-21	PR-006
2	9-23-21	PR-X HTHW REROUTE

PROJECT NUMBER 18136

PIPING FLOOR - MECHANICAL PLAN

M-102-2

FFKR ARCHITECTS

U303 22508 Heat Plant Seismic Upgrade - Penthouse Stairs Narrative
U of U Project: 22508
May 17, 2022

Seismic upgrade design (Structural):

- A set of stairs needs to be removed due to the seismic bracing design.

Seismic upgrade design (Architectural):

- Remove the existing ships ladder.
- A 7″ rise and 11″ run stairs to go from Fan level to Piping level.
- A 7″ rise and 11″ run stairs to go from Piping level to the Roof.
- Create a penthouse to house the stairs and a mechanical louver.

Seismic upgrade design (Mechanical):

- Add louver and motorized control damper at the penthouse level.

FFKR ARCHITECTS

May 12, 2021

Phase 3 PR #4
Architectural Design Narrative
See the following architectural, structural, and MEP changes description.

Architectural Design Changes:

1. Remove the penthouse curb that was built in Phase 2.
2. Install a set of stairs to connect from the Piping level to the Roof level.
3. Install an enclosed structure (penthouse) to house the stairs, hoist shaft, and overhead crane.

Attachments:

AD-101-3 Demo Floor & Roof Plans - Phase 3
AD-501 Demo Details
AE-102-3 Piping Level Floor Plane - Phase 3
AE-103-3 Fan Level Floor Plane - Phase 3
AE-104-3 Roof Plan - Phase 3
AE-205-3 Penthouse Elevations
AE-401-3 Penthouse Stairs Shaft Plans
AE-411-3 Penthouse Stairs Sections
AE-505 Roof Details
Specification sections

FFKR Architects
Ying Peng

ARW ENGINEERS
structural consultants

MEMORANDUM

Project: U of U Bldg 303 Seismic Upgrade Phase 3 — Project No: 18923.C3
Location: Office — Date: May 10, 2021

( ) Telephone ( ) Conference ( ) Field (X) Memo

Memo by: Jordan Clark, PE
Reviewed by: Robert M. Moyle, SE

RE: PR #4

Comments/Items Discussed:

The following items have been revised to reflect changes due to the stair and penthouse framing being added to Phase 3:

- SG-001 – Structural Notes and Schedules– Revised Structural Sheet Index to include Penthouse Framing Plan and additional detail sheet.
- SG-002 – Beam Connection Schedule – Revised schedule to include C8 and C12 channel connections.
- A/S-102-3 – Piping Floor Framing Plan/Office Roof Framing Plan – Phase 3 – Revised framing to accommodate stair and hoistway openings.
- B/S-102-3 – Stair Landing Framing Plan – Added framing plan for intermediate stair landing between Piping and Fan Floor.
- A/S-103-3 – Fan Floor Framing Plan – Phase 3 – Revised framing to accommodate stair and hoistway openings.
- B/S-103-3 – Stair Landing Framing Plan – Added framing plan for intermediate stair landing between Fan Floor and Roof.
- A/S-104-3 – Roof Framing Plan – Phase 3 – Added columns for Penthouse framing. Revised beam sizes at buttresses to match detailing for drag connection.
- A/S-105-3 – Penthouse Framing Plan – Phase 3 – Added framing plan for Penthouse and hoist beam.
- S-204-3 – Phase 3 Details – Added new details for stair and Penthouse framing.

Let us know if you have any questions.

Copy to: Ying Peng and Jackson Ferguson (FFKR)

Filing: (X) Project File ( ) Other

ARW_Phase 3 PR #4_mem_20210510.docx

12600 West Colfax Avenue, Suite A-400 | Lakewood, Colorado 80215 | 303.239.0909
Denver // Phoenix | rmhgroup.com

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on 5/17/2022

May 4, 2021

Re: University of Utah Project 22436 – Building 0303 HTW High temperature water plant seismic upgrade Phase 3: Proposal Request PR-004 - Penthouse

Purpose: This PR includes the following items which are changes, clarifications, additions, and/or deletions that are hereby included as part of the contract documents. This PR forms a part of the Contract Documents and modifies the original documents dated December 16, 2020.

Reason: Owner Request : Move penthouse construction to phase 3 of the seismic upgrade project

Added Specification Sections:

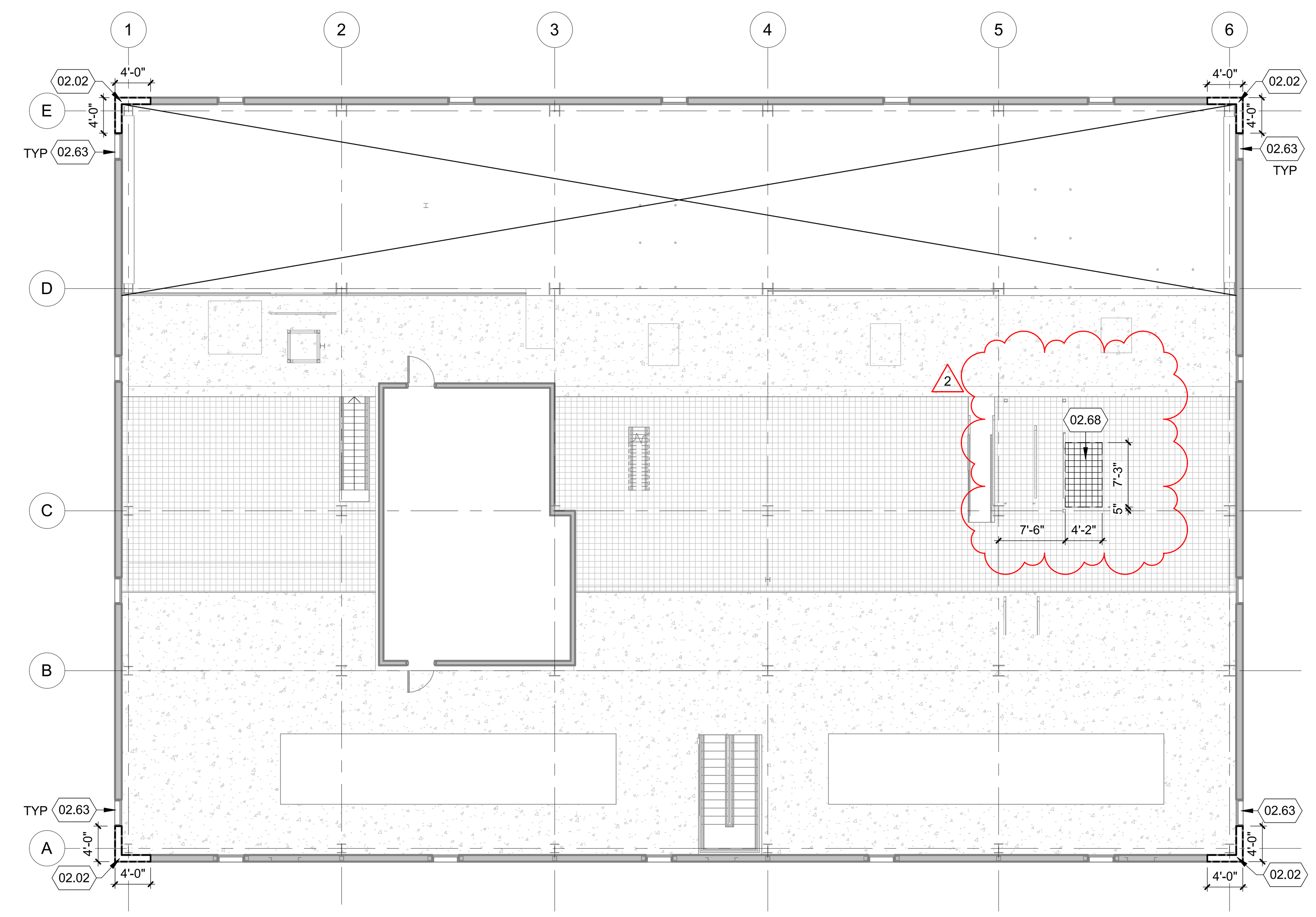
- 23 0500 – Common Work Results for Mechanical
- 23 0548 – Wind Seismic and Vibration Controls for Mechanical Work
- 23 0800 – Commissioning of Mechanical
- 23 0913 – Instrumentation and Controls for HVAC
- 23 3700 – Air Outlets and Inlets
- 26 0500 – Basic Electrical Materials and Methods
- 26 0519 – Wires and Cables (600V)
- 26 0526 – Grounding and Bonding
- 26 0533 –Raceways
- 26 2726 Switches and Receptacles

Scope:

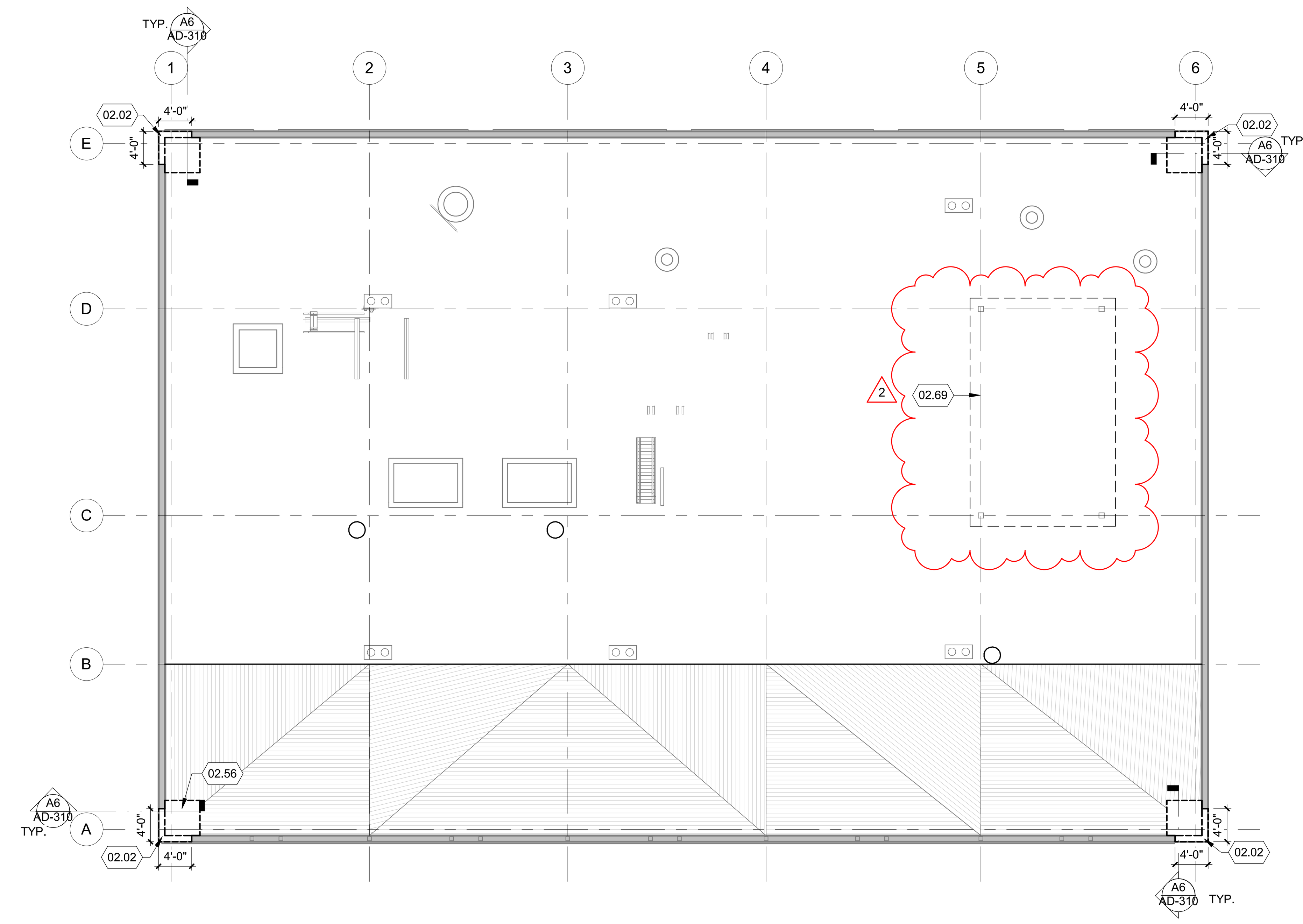
M-104-3 – Add louver and motorized control damper to east penthouse wall
M-601-3 – Add louver damper control to the existing JCI DDC system. Damper can be opened to release heat from the building and to provide additional combustion air

E-001-3 – Add electrical support for motorized control damper
Add fixture type descriptions to be installed
Add panel schedule description of circuits to be installed.
E-101-3 – Relocate existing conduits to accommodate new floor opening.
EL-103-3 – Relocate light fixture where new stairway will be located
Relocate conduits to accommodate new stairway
Replace existing light switch with 3-way type switch.
EL-104-3 – Add two new weatherproof GFCI type receptacles
Add two new outdoor wall mount light fixtures with integral photocell
Add one SPST switch for outdoor lighting
Add one 3-way switch for indoor Penthouse lighting.
Add disconnect switch and circuitry for motorized damper control.

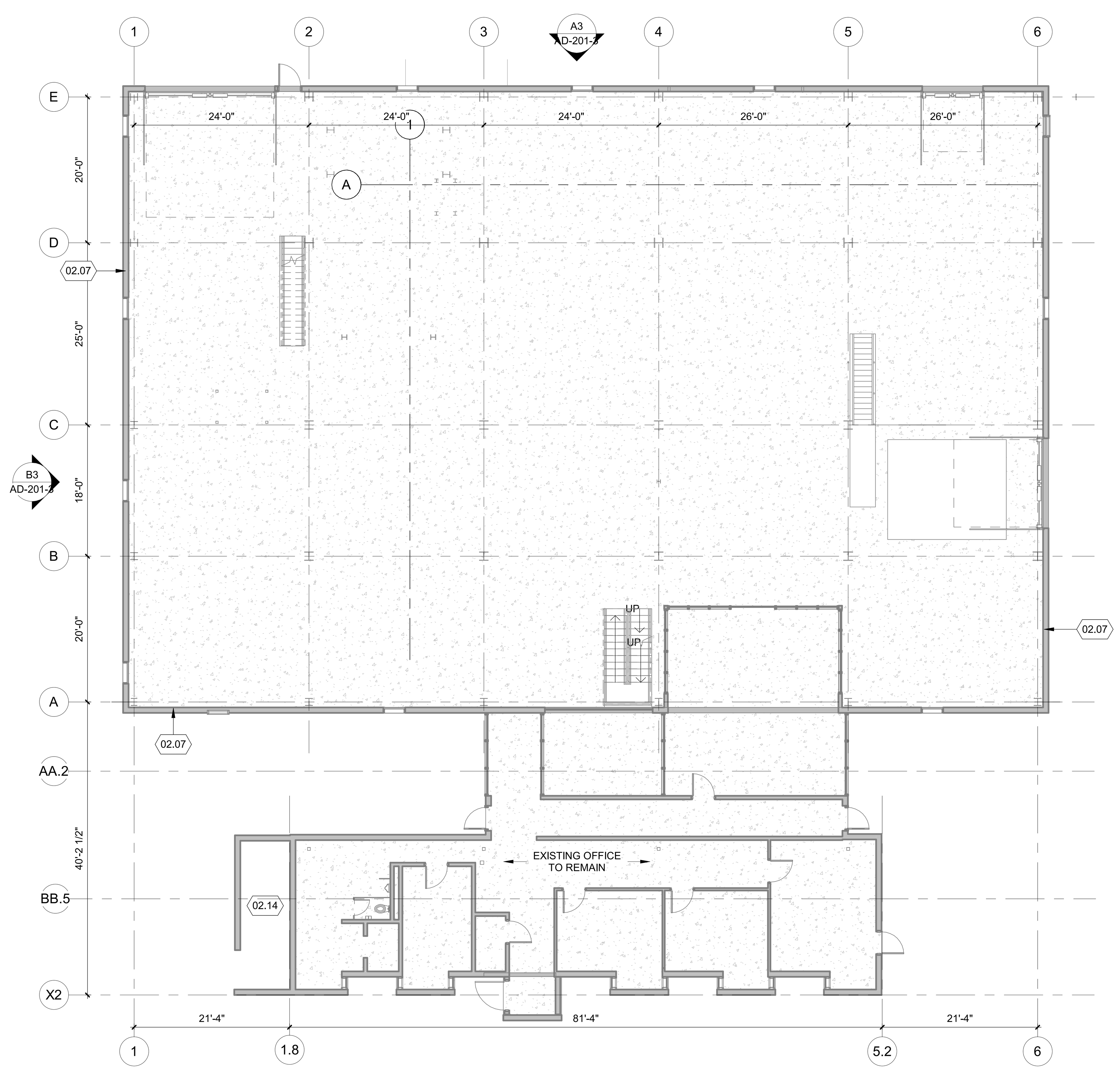
05/18/2022 3:08:43 PM



C1 FAN FLOOR (EL. 4772'-0") - DEMO PLAN
SCALE: 3/32" = 1'-0"

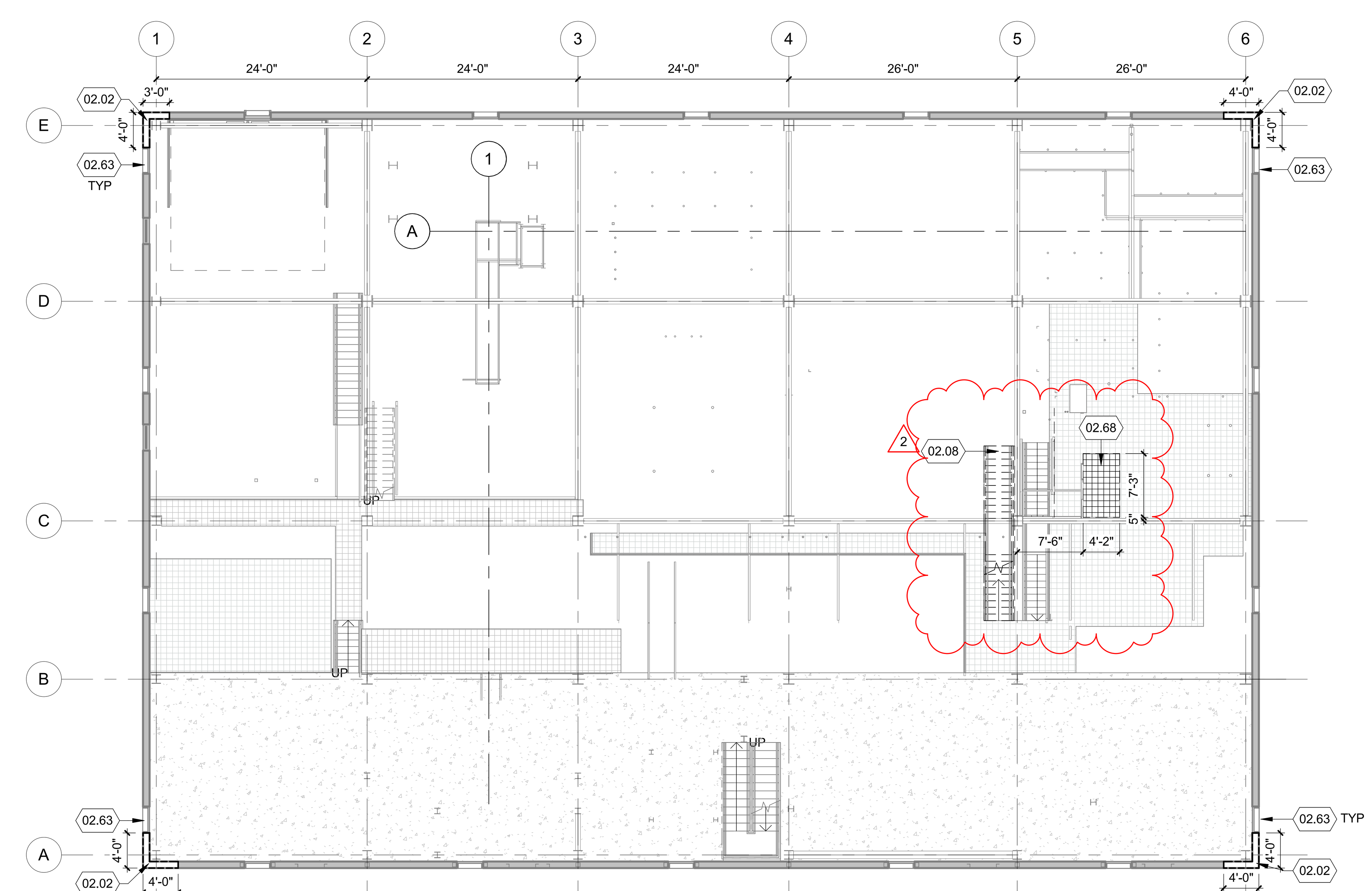


C4 ROOF - DEMO PLAN
SCALE: 3/32" = 1'-0"



NOTE: NO INTERIOR ARCHITECTURAL WORK PERFORMED ON THIS LEVEL, ALSO REFER TO STRUCTURAL DWGS.

A1 OPERATING FLOOR (EL. 4742'-0") - DEMO PLAN
SCALE: 3/32" = 1'-0"



A4 PIPING FLOOR (EL. 4757'-0") - DEMO PLAN
SCALE: 3/32" = 1'-0"

REFERENCE NOTES

02.02	REMOVE EXISTING MASONRY WALL FROM 11'-0" A.F.F. AND UP, BRACE EXISTING MASONRY AS REQ'D
02.07	EXISTING MASONRY WALL TO REMAIN
02.08	REMOVE EXISTING STAIR FROM PIPING TO FAN LEVEL
02.14	PROTECT AND MAINTAIN EXISTING GAS YARD
02.56	PEEL ROOFING BACK 3'-0" OR AS REQ'D, TO BE REUSED WITH NEW ROOFING OR WALL ASSEMBLY
02.63	BRACE EXISTING WINDOW TO STRUCTURE AS REQ'D
02.68	EXISTING METAL GRATING
02.69	REMOVE EXISTING PENTHOUSE CURB AND ROOF ASSEMBLY

PHASE 3 DEMO LEGEND

- EXISTING TO BE REMOVED
- EXISTING CONCRETE FLOOR
- EXISTING FLOOR GRATE

2

DEMO GENERAL NOTES

1. FIELD VERIFY EXISTING CONDITION: MEP CONDUITS, PIPES, STRUCTURE COMPONENTS, ETC..
2. REMOVE AND RELOCATE EXISTING MEP CONDUITS, PIPES, ETC. AND SUB STRUCTURE COMPONENTS AS REQUIRED TO CREATE THE DESIGNED SHAFT OPENING. ALSO REFER TO MEP DWGS.

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

STATE OF UTAH
JACKSON FERGUSON, AIA
#5340042-0301
LICENSED ARCHITECT
12.15.2020

	DATE	REVISION
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

DEMO FLOOR & ROOF PLANS PHASE 3

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

~~8-23-2021~~

AD-101-3

8/20/2021 2:47:56 PM

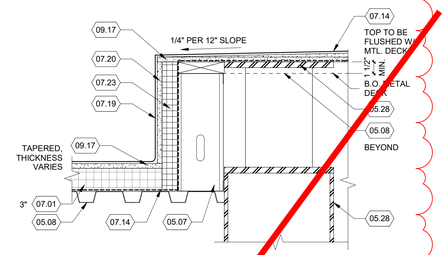
REFERENCE NOTES

02.02	REMOVE EXISTING MASONRY WALL FROM 11'-0" A.F.F. AND UP, BRACE EXISTING MASONRY AS REQ'D
02.07	EXISTING MASONRY WALL TO REMAIN
02.10	EXISTING DECKING TO REMAIN FROM GRID A TO B
02.24	REMOVE EXISTING ROOFING AND INSULATION
02.30	EXISTING ROOFING AND INSULATION TO REMAIN
02.45	REMOVE EXISTING RAIL AT CUTOUT
02.46	EXISTING STRUCTURE TO REMAIN
02.56	PEEL ROOFING BACK 3'-0" OR AS REQ'D, TO BE REUSED WITH NEW ROOFING OR WALL ASSEMBLY
02.58	REMOVE EXISTING METAL COPING AND ASSOCIATED BLOCKING
02.59	REMOVE EXISTING ROOFING, INSULATION AND DECKING BELOW
05.07	6" METAL STUD
05.08	METAL ROOF DECKING
05.28	STEEL STUB, RE. STR. DWG.
07.01	RIGID ROOF INSULATION. MIN. R 32,, THICKNESS VARIES
07.14	WEATHER BARRIER
07.19	SINGLE PLY ROOFING MEMBRANE TO WRAP OVER CURB WALL
07.20	5/8" EXTERIOR GLASS MAT SHEATHING
07.23	2" RIGID INSULATION
09.17	5/8" COVER BOARD

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

2

REMOVE/DEMOLISH PENTHOUSE CURB FROM THE PHASE 2 PROJECT SCOPE

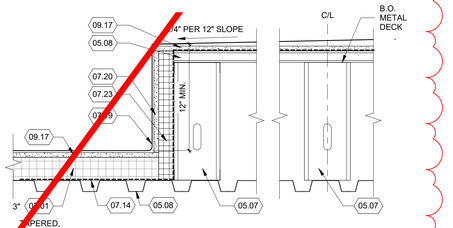


NOTE: TOP OF THE PENTHOUSE CURB TO BE LEVELED, SLOPING IS ACHIEVED THROUGH TAPERED INSULATION OR SLOPED METAL DECK

C4 PENTHOUSE CURB @ CORNER-DEMO

SCALE: 1 1/2" = 1'-0"

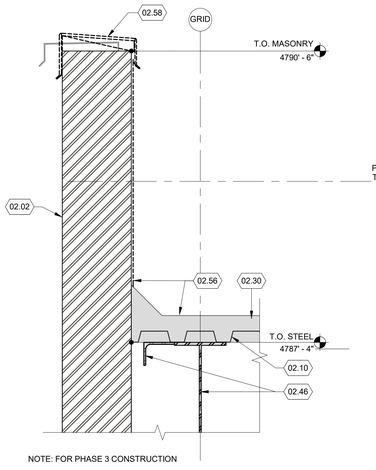
NOT USED



NOTE: TOP OF THE PENTHOUSE CURB TO BE LEVELED, UNIFORMED THROUGHOUT, SLOPING IS ACHIEVED THROUGH TAPERED INSULATION OR SLOPED METAL DECK

B4 PENTHOUSE CURB-DEMO

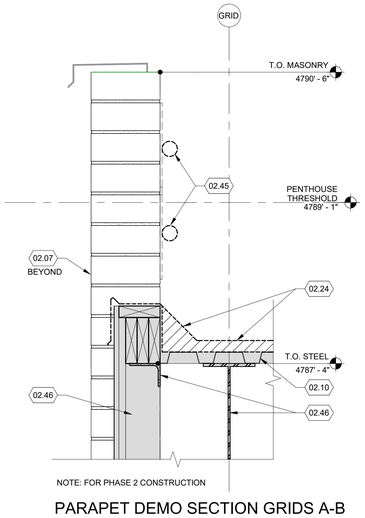
SCALE: 1 1/2" = 1'-0"



NOTE: FOR PHASE 3 CONSTRUCTION

B5 PARAPET DEMO SECTION

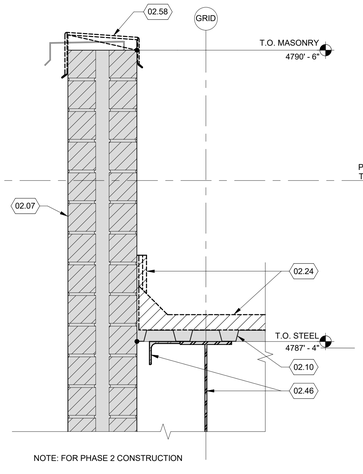
SCALE: 1 1/2" = 1'-0"



NOTE: FOR PHASE 2 CONSTRUCTION

A2 PARAPET DEMO SECTION GRIDS A-B (ABOVE EXISTING WINDOWS)

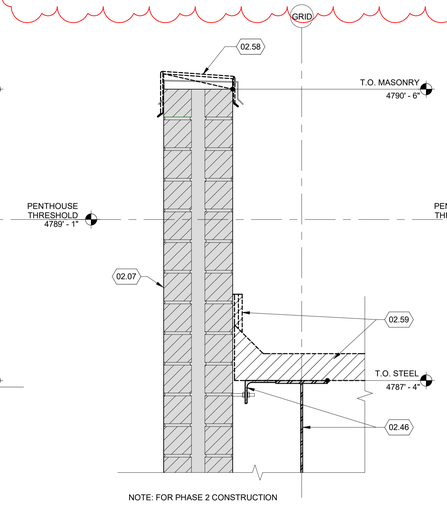
SCALE: 1 1/2" = 1'-0"



NOTE: FOR PHASE 2 CONSTRUCTION

A3 PARAPET DEMO SECTION GRIDS A-B

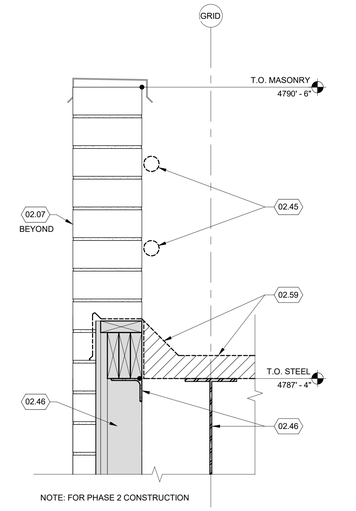
SCALE: 1 1/2" = 1'-0"



NOTE: FOR PHASE 2 CONSTRUCTION

A4 PARAPET DEMO SECTION GRIDS B-E

SCALE: 1 1/2" = 1'-0"



NOTE: FOR PHASE 2 CONSTRUCTION

A5 PARAPET DEMO SECTION (ABOVE EXISTING WINDOWS)

SCALE: 1 1/2" = 1'-0"

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

~~8-23-2021~~

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH · JACKSON FERGUSON, AIA · REGISTERED ARCHITECT · LICENSED ARCHITECT · 12-16-2020

△	DATE	REVISION
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

DEMO DETAILS

AD-501

05/18/2022 3:08:43 PM

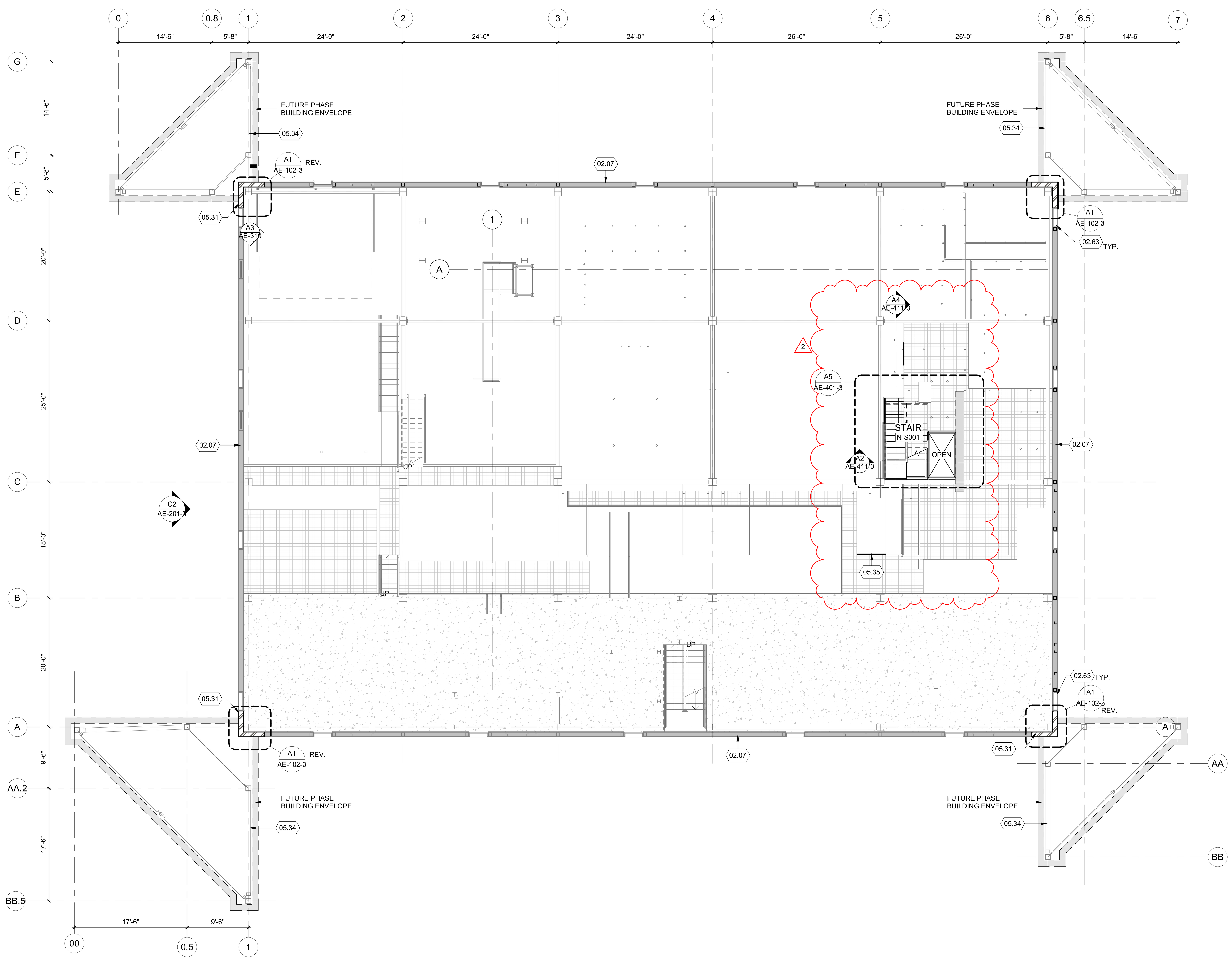
REFERENCE NOTES

- 02.07 EXISTING MASONRY WALL TO REMAIN
- 02.32 EXISTING FLOOR TO REMAIN
- 02.46 EXISTING STRUCTURE TO REMAIN
- 02.63 BRACE EXISTING WINDOW TO STRUCTURE AS REQ'D
- 05.02 STRUCTURAL BEAM, PRIMED & PAINTED
- 05.07 6" METAL STUD
- 05.31 METAL STUD WALL WITH 1" PREPAINTED METAL PANEL (COLOR TO MATCH EXISTING) & VAPOR RETARDER ON THE OUTSIDE, AND 5/8" EXTERIOR GYPSUM SHEATHING & SINGLE PLY ROOFING MEMBER ON THE INSIDE AT ROOF/PARAPET LEVEL
- 05.32 24 GAUGE PREPAINTED METAL PANEL (COLOR TO MATCH EXISTING) WITH EXPOSED FASTENER, CAULKING AND CLOSURE ANGLE AT ALL EDGES
- 05.33 SHEET METAL FLASHING AND TRIM, COLOR TO MATCH ADJACENT SURFACE, CAULKING AND CLOSURE ANGLE AT ALL EDGES
- 05.34 EXTERNAL STEEL BUTTRESS SYSTEM, SHOP PRIMED
- 05.35 42" HIGH GUARD RAIL WITH A MID RAIL AND 4" BASE, MATCH EXISTING, PAINTED
- 07.14 WEATHER BARRIER

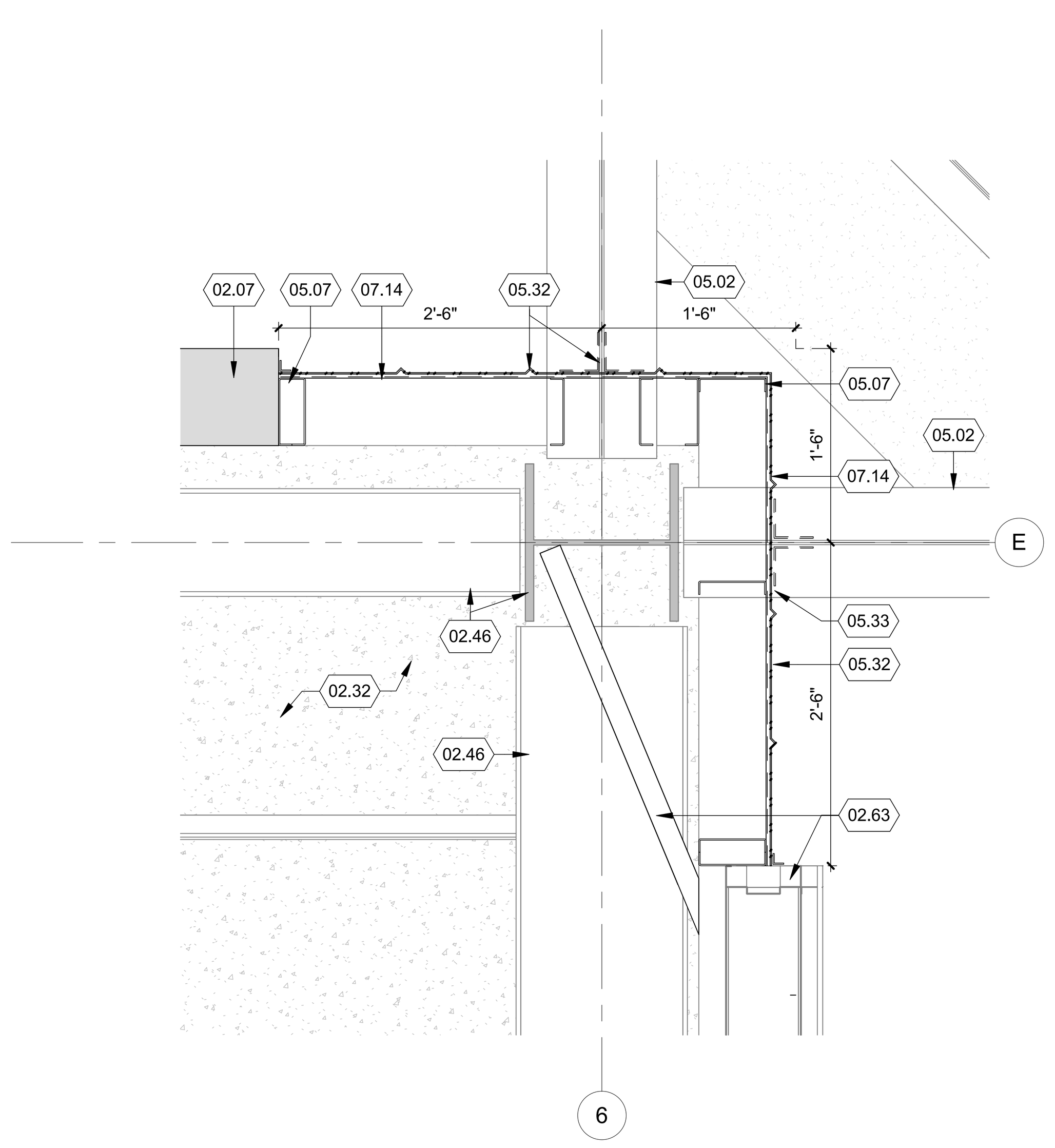
FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020



A3 PIPING FLOOR PLAN (EL. 4757'-0")
SCALE: 1/8" = 1'-0"



A1 CORNER DETAIL (TYP.)
SCALE: 1" = 1'-0"

PHASE 3 FLOOR LEGEND

- CONCRETE FLOOR
- EXISTING FLOOR GRATE

STATE OF UTAH JACKSON FERGUSON, AIA #5340042-0301 LICENSED ARCHITECT 12.15.2020

△	DATE	REVISION
1	1-21-2021	Add #4/Checker Comments
2	5-3-2021	Phase 3 PR #4

GENERAL NOTES

1. NOT USED
2. SOME MECHANICAL EQUIPMENT NOT SHOWN FOR CLARITY.

DATUM NOTES

1. THE ELEVATION MARKERS ON THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS ARE 3'-0" LOWER THAN THE SURVEY (UNIVERSITY BENCHMARK). DO NOT USE THESE MARKERS OUTSIDE OF THE BUILDING ENVELOPE.
2. THE CIVIL DRAWINGS ARE INLINE WITH THE CURRENT UNIVERSITY BENCHMARK.

~~8-23-2021~~

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

PROJECT NUMBER 18136

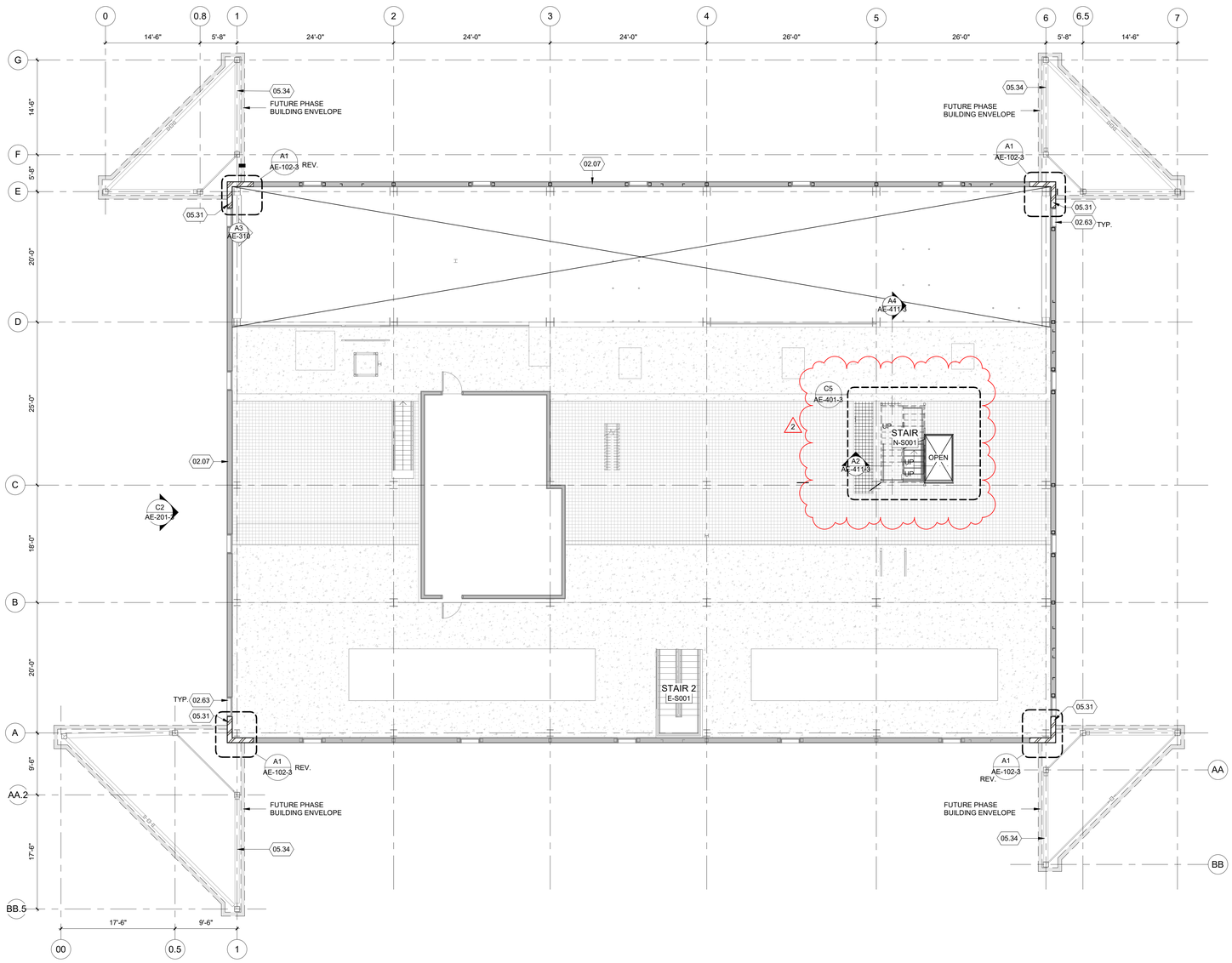
PIPING LEVEL FLOOR PLAN PHASE 3

AE-102-3

8/20/2021 2:48:00 PM

REFERENCE NOTES

02.07	EXISTING MASONRY WALL TO REMAIN
02.63	BRACE EXISTING WINDOW TO STRUCTURE AS REQ'D
05.31	METAL STUD WALL WITH 1" PREPAINTED METAL PANEL (COLOR TO MATCH EXISTING) & VAPOR RETARDER ON THE OUTSIDE, AND 5/8" EXTERIOR GYPSUM SHEATHING & SINGLE PLY ROOFING MEMBER ON THE INSIDE AT ROOF/PARAPET LEVEL
05.34	EXTERNAL STEEL BUTTRESS SYSTEM, SHOP PRIMED



GENERAL NOTES

1. NOT USED
2. SOME MECHANICAL EQUIPMENT NOT SHOWN FOR CLARITY.

DATUM NOTES

1. THE ELEVATION MARKERS ON THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS ARE 3'-0" LOWER THAN THE SURVEY (UNIVERSITY BENCHMARK). DO NOT USE THESE MARKERS OUTSIDE OF THE BUILDING ENVELOPE.
2. THE CIVIL DRAWINGS ARE IN LINE WITH THE CURRENT UNIVERSITY BENCHMARK.

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

A3 FAN LEVEL FLOOR PLAN (EL. 4772'-0")
SCALE: 1/8" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

STATE OF UTAH
JACKSON FERGUSON, AIA
LICENSED ARCHITECT
12-15-2020

△	DATE	REVISION
1	1-21-202 1	Add #4/Checker Comments
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

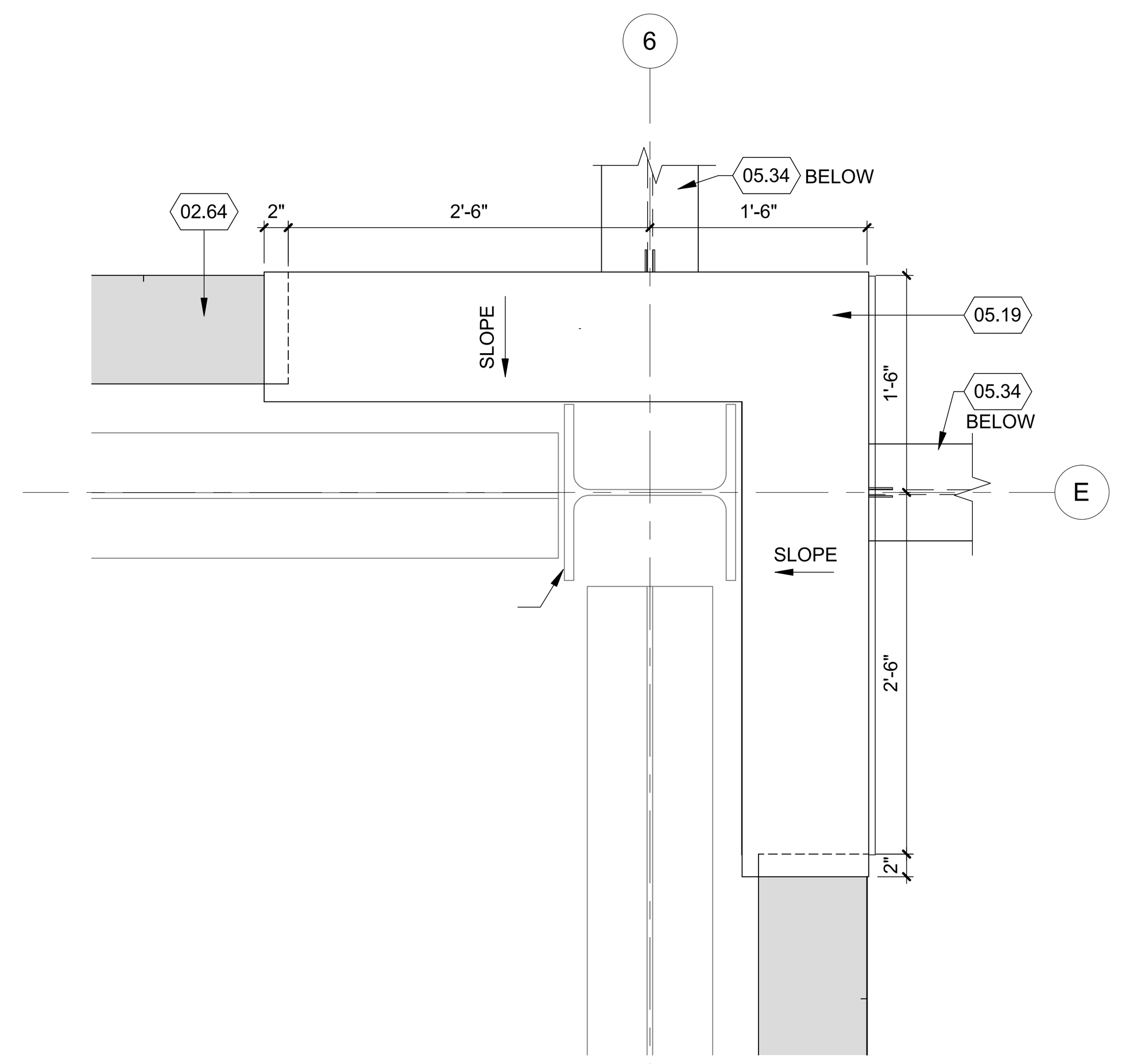
FAN LEVEL FLOOR PLAN PHASE 3

AE-103-3

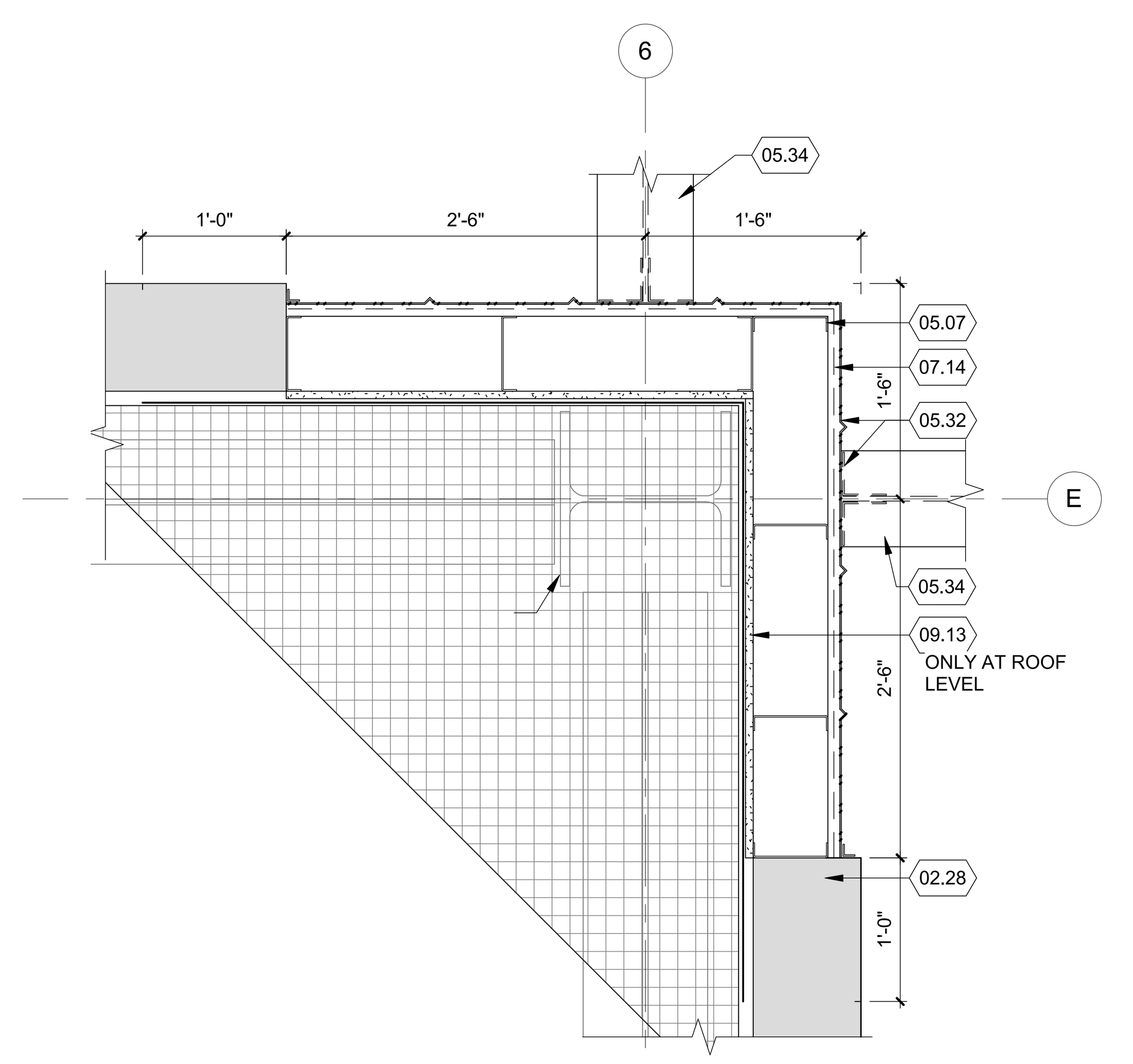
05/18/2022 3:08:43 PM

REFERENCE NOTES

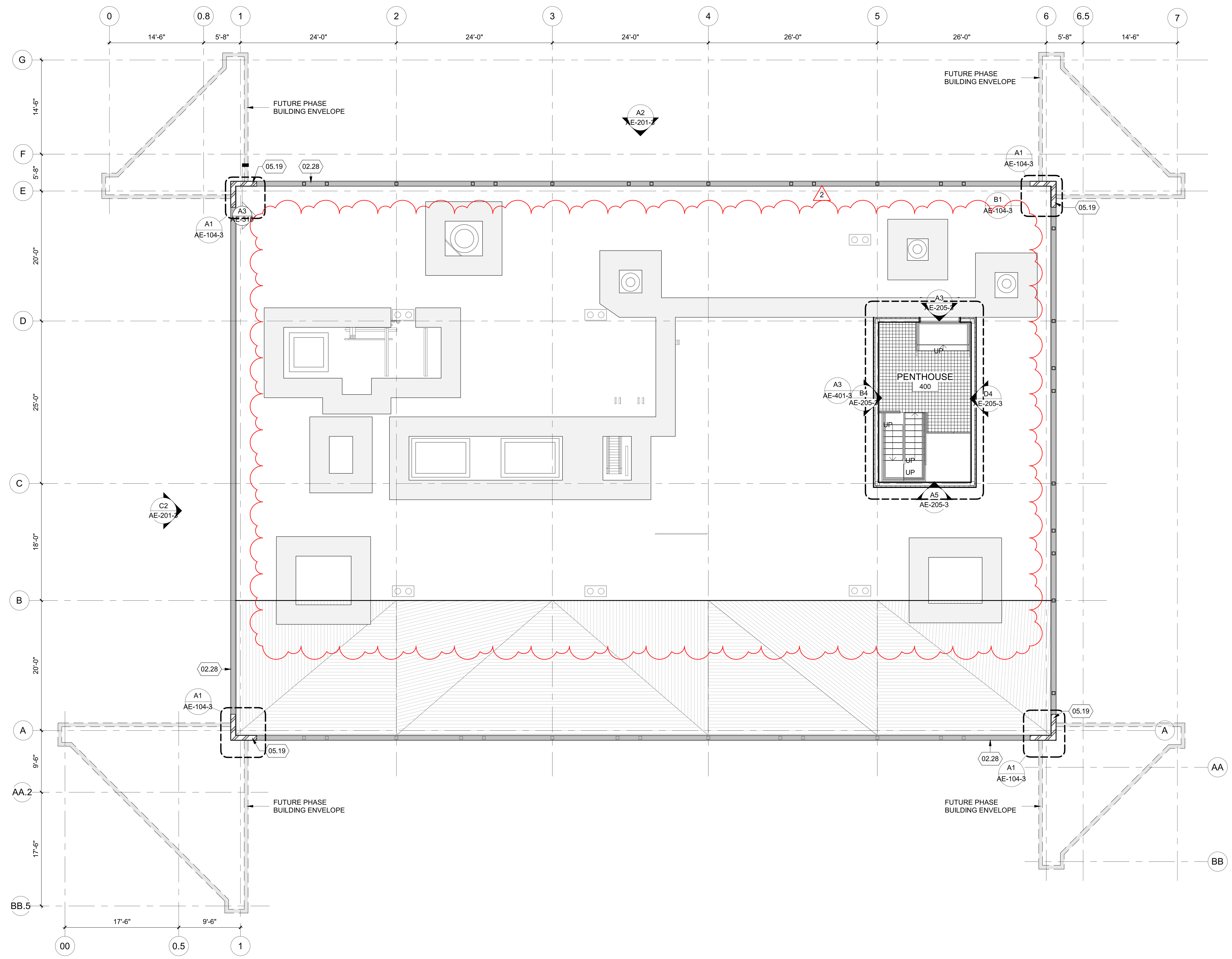
- 02.28 EXISTING PARAPET TO REMAIN
- 02.64 EXISTING PARAPET CAP
- 05.07 6" METAL STUD
- 05.19 PREPAINTED METAL PARAPET CAP
- 05.32 24 GAUGE PREPAINTED METAL PANEL (COLOR TO MATCH EXISTING) WITH EXPOSED FASTENER, CAULKING AND CLOSURE ANGLE AT ALL EDGES
- 05.34 EXTERNAL STEEL BUTTRESS SYSTEM, SHOP PRIMED
- 07.14 WEATHER BARRIER
- 09.13 5/8" EXTERIOR GYPSUM SHEATHING



B1 PARAPET DETAIL (TYPICAL)
SCALE: 1" = 1'-0"



A1 ROOF DETAIL - PHASE 3 (TYPICAL)
SCALE: 1" = 1'-0"



A3 ROOF PLAN - PHASE 3
SCALE: 1/8" = 1'-0"

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

GENERAL NOTES

1. NOT USED
2. SOME MECHANICAL EQUIPMENT NOT SHOWN FOR CLARITY.

DATUM NOTES

1. THE ELEVATION MARKERS ON THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS ARE 3'-0" LOWER THAN THE SURVEY (UNIVERSITY BENCHMARK). DO NOT USE THESE MARKERS OUTSIDE OF THE BUILDING ENVELOPE.
2. THE CIVIL DRAWINGS ALIGN WITH THE CURRENT UNIVERSITY BENCHMARK.

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

STATE OF UTAH · JACKSON FERGUSON, AIA · LICENSED ARCHITECT · 12.16.2020

△	DATE	REVISION
1	1-21-2021	Add #4/Checker Comments
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

ROOF PLAN PHASE 3

AE-104-3

8/20/2021 2:48:03 PM

REFERENCE NOTES

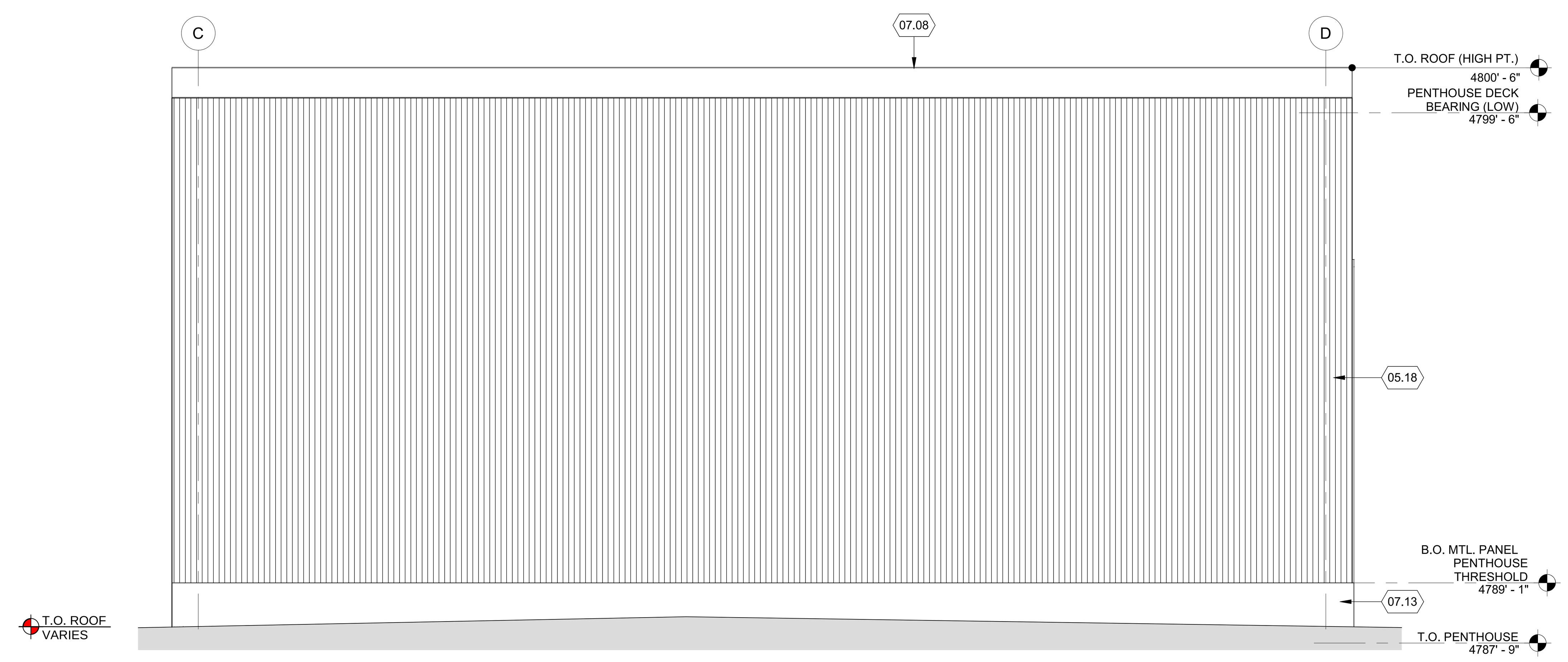
05.18 3" INSULATED METAL PANEL TO SPAN VERTICALLY, WITH STEEL FRAME ATTACHED TO EXISTING STRUCTURE

07.08 SINGLE PLY ROOFING WITH MIN. R 32 INSULATION,, 1/4" PER 12" SLOPE INSULATION, NEW METAL B DECK

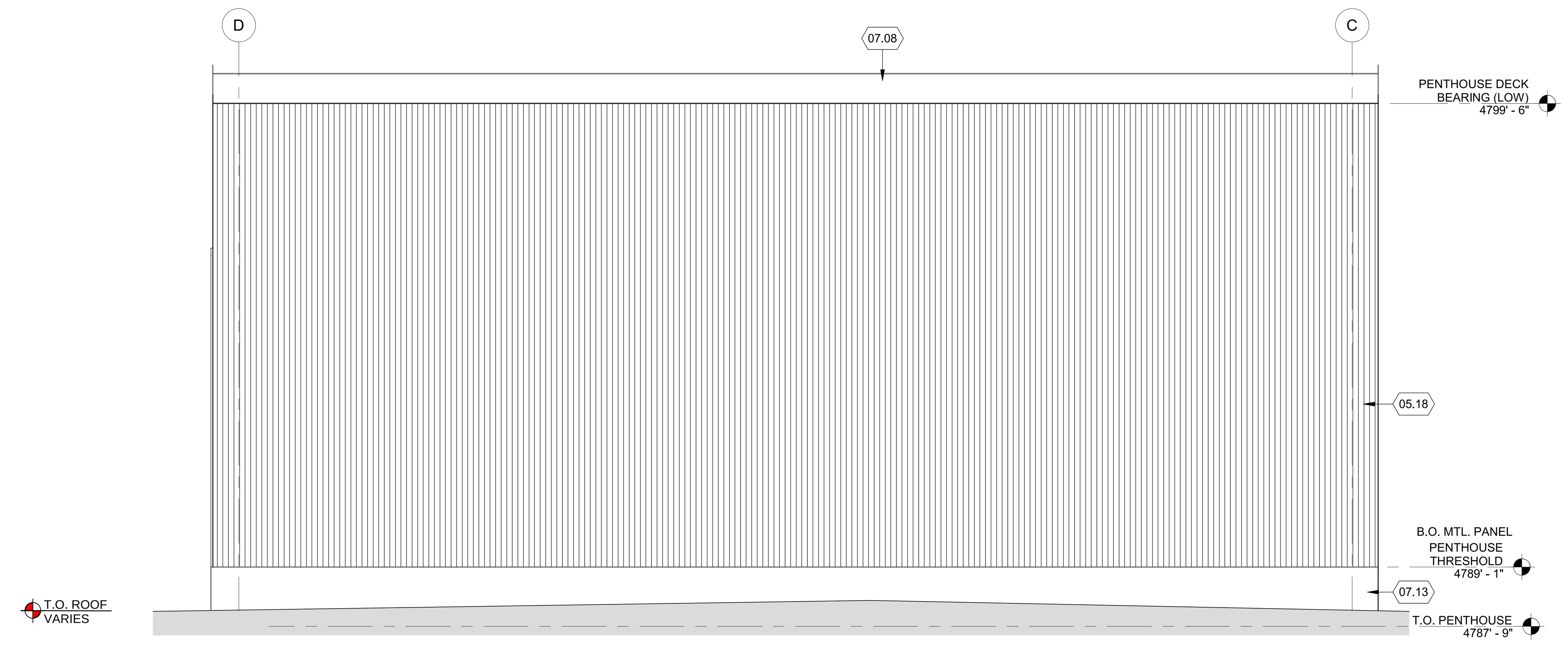
07.13 SINGLE PLY ROOFING

08.11 (2) 3'-0" X 7'-0" PAINTED HOLLOW METAL DOOR AND FRAME, WITH PASSAGE DOOR HARDWARE (NO LOCKS), MANUAL FLUSH BOLTS ON THE 2ND LEAF

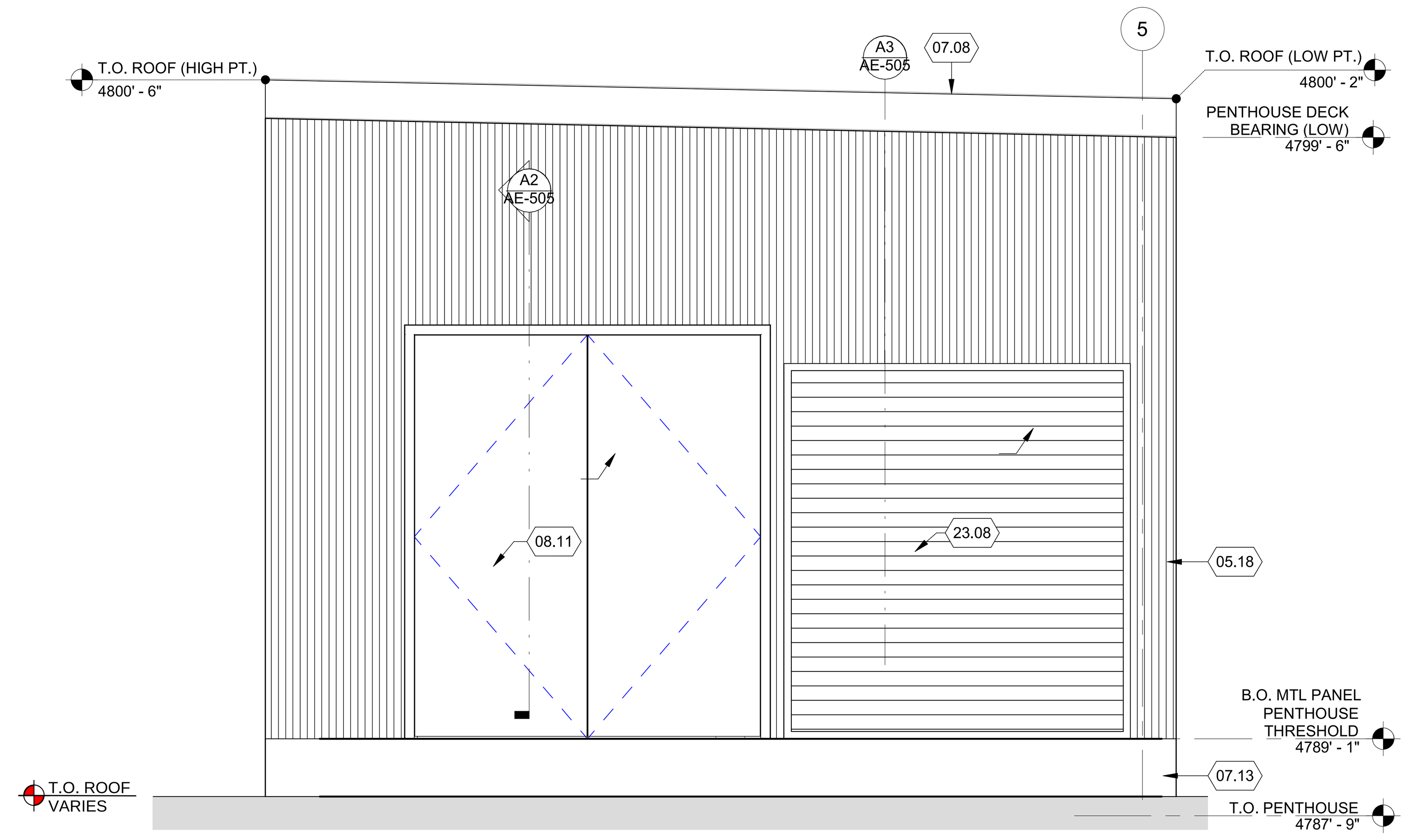
23.08 FIXED AIR INTAKE LOUVER WITH MECHANICALLY OPERATED DAMPER, RE. MECH. DWG. FOR ACTUAL SIZE AND STR. DWG. FOR SUPPORT



D4 PENTHOUSE SOUTH ELEVATION
SCALE: 1/2" = 1'-0"



B4 PENTHOUSE NORTH ELEVATION
SCALE: 1/2" = 1'-0"



A3 PENTHOUSE EAST ELEVATION
SCALE: 1/2" = 1'-0"

A5 PENTHOUSE WEST ELEVATION
SCALE: 1/2" = 1'-0"

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

STATE OF UTAH LICENSED ARCHITECT JACKSON FERGUSON, MA #5340044-0301 12.15.2020

△	DATE	REVISION
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

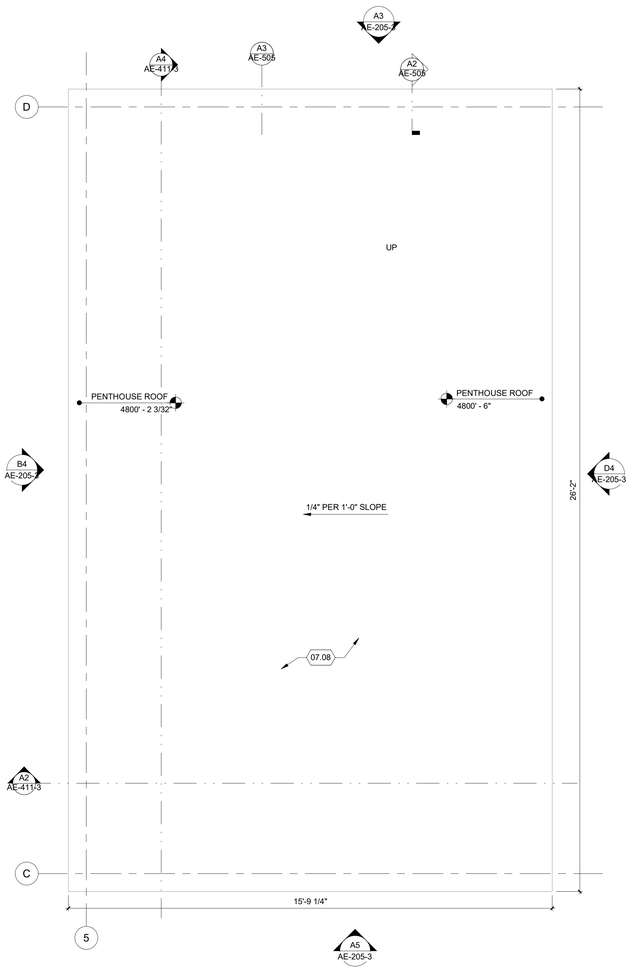
PENTHOUSE ELEVATIONS

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

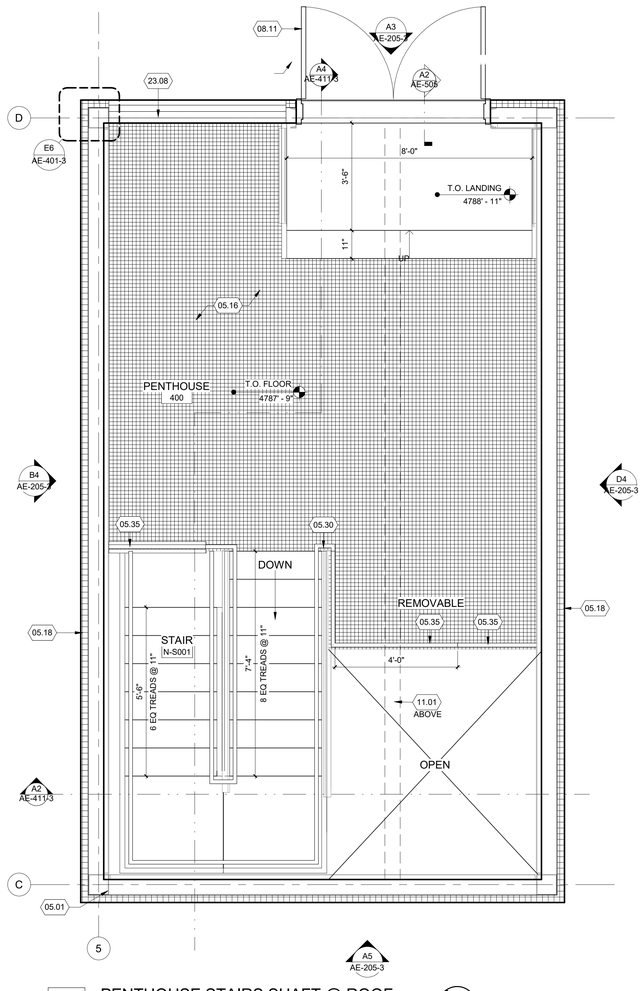
~~8-23-2021~~

2

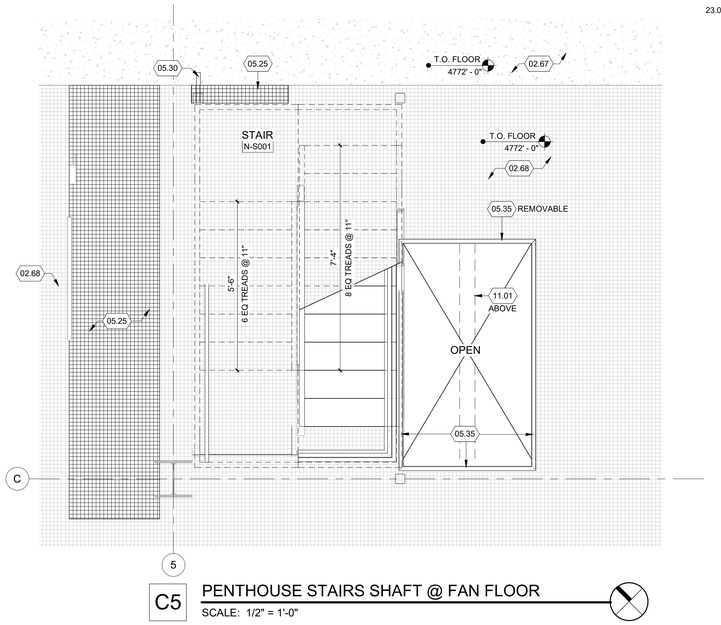
AE-205-3



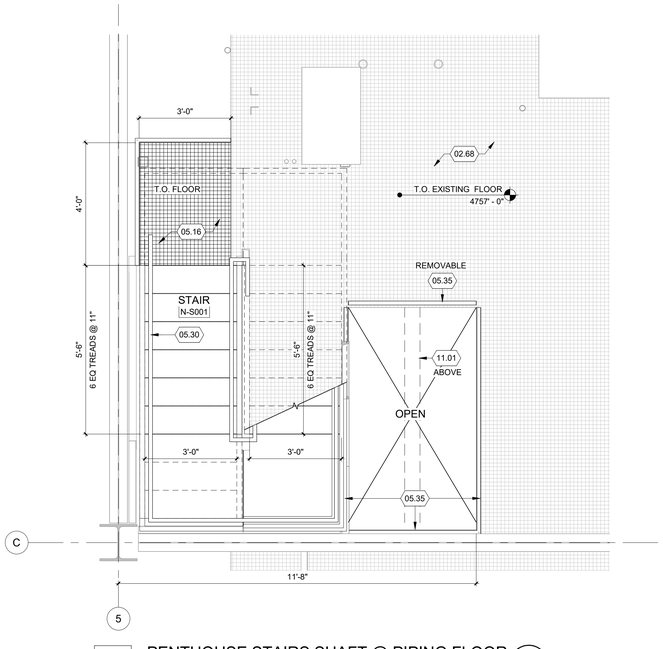
A1 PENTHOUSE ROOF
SCALE: 1/2" = 1'-0"



A3 PENTHOUSE STAIRS SHAFT @ ROOF
SCALE: 1/2" = 1'-0"



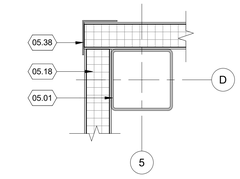
C5 PENTHOUSE STAIRS SHAFT @ FAN FLOOR
SCALE: 1/2" = 1'-0"



A5 PENTHOUSE STAIRS SHAFT @ PIPING FLOOR
SCALE: 1/2" = 1'-0"

REFERENCE NOTES

02.31	EXISTING TO BE REMOVED AND REINSTALLED
02.67	EXISTING CONCRETE FLOOR
02.68	EXISTING METAL GRATING
05.01	STRUCTURAL COLUMN, PRIMED & PAINTED
05.16	NEW METAL FLOOR GRATE, RE. STR. DWG. FOR SUPPORT DETAIL
05.18	3" INSULATED METAL PANEL TO SPAN VERTICALLY, WITH STEEL FRAME ATTACHED TO EXISTING STRUCTURE
05.25	INFILL OPENING WITH METAL GRATE, SIMILAR TO EXISTING, RE. STR. DWG. FOR DETAIL
05.30	1 1/2" STEEL HANDRAIL, EXTEND AS REQUIRED, PAINTED
05.35	42" HIGH GUARD RAIL WITH A MID RAIL AND 4" BASE, MATCH EXISTING, PAINTED
05.38	PAINTED METAL PANEL CLOSURE TRIM, COLOR TO MATCH, TYP AT ALL CONNECTION POINTS
07.08	SINGLE PLY ROOFING WITH MIN. R 32 INSULATION,, 1/4" PER 12" SLOPE INSULATION, NEW METAL B DECK
08.11	(2) 3'-0" X 7'-0" PAINTED HOLLOW METAL DOOR AND FRAME, WITH PASSAGE DOOR HARDWARE (NO LOCKS), MANUAL FLUSH BOLTS ON THE 2ND LEAF
11.01	MECHANICALLY OPERATED 1000 LBS CAPACITY (MIN.) CRANE. ON ROLLERS FOR BACK/FORTH SLIDING (MANUAL)
23.08	FIXED AIR INTAKE LOUVER WITH MECHANICALLY OPERATED DAMPER, RE. MECH. DWG. FOR ACTUAL SIZE AND STR. DWG. FOR SUPPORT



E6 PENTHOUSE CORNER DETAIL
SCALE: 1 1/2" = 1'-0"

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

~~8-23-2021~~

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH
JACKSON FERGUSON, AIA
LICENSED ARCHITECT
12-15-2020

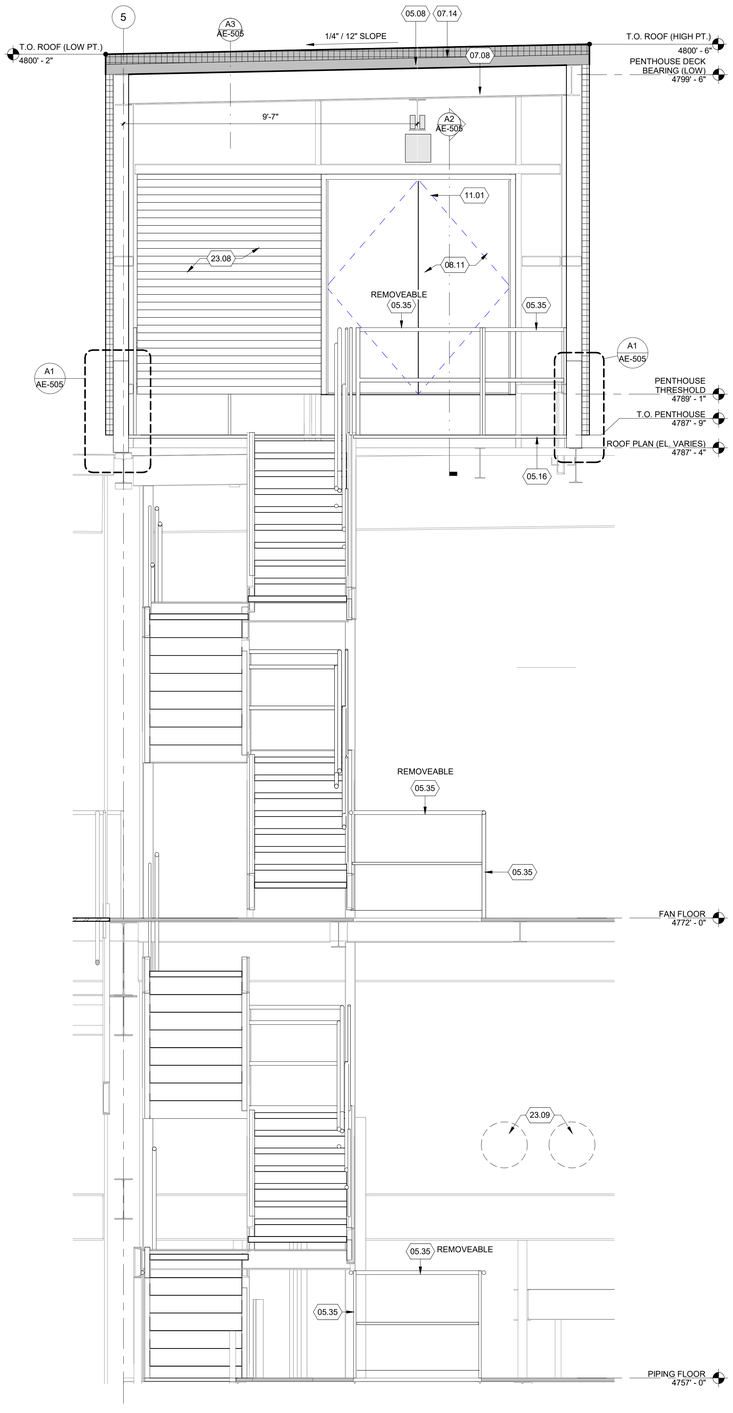
△	DATE	REVISION
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

PENTHOUSE STAIRS SHAFT PLANS

2

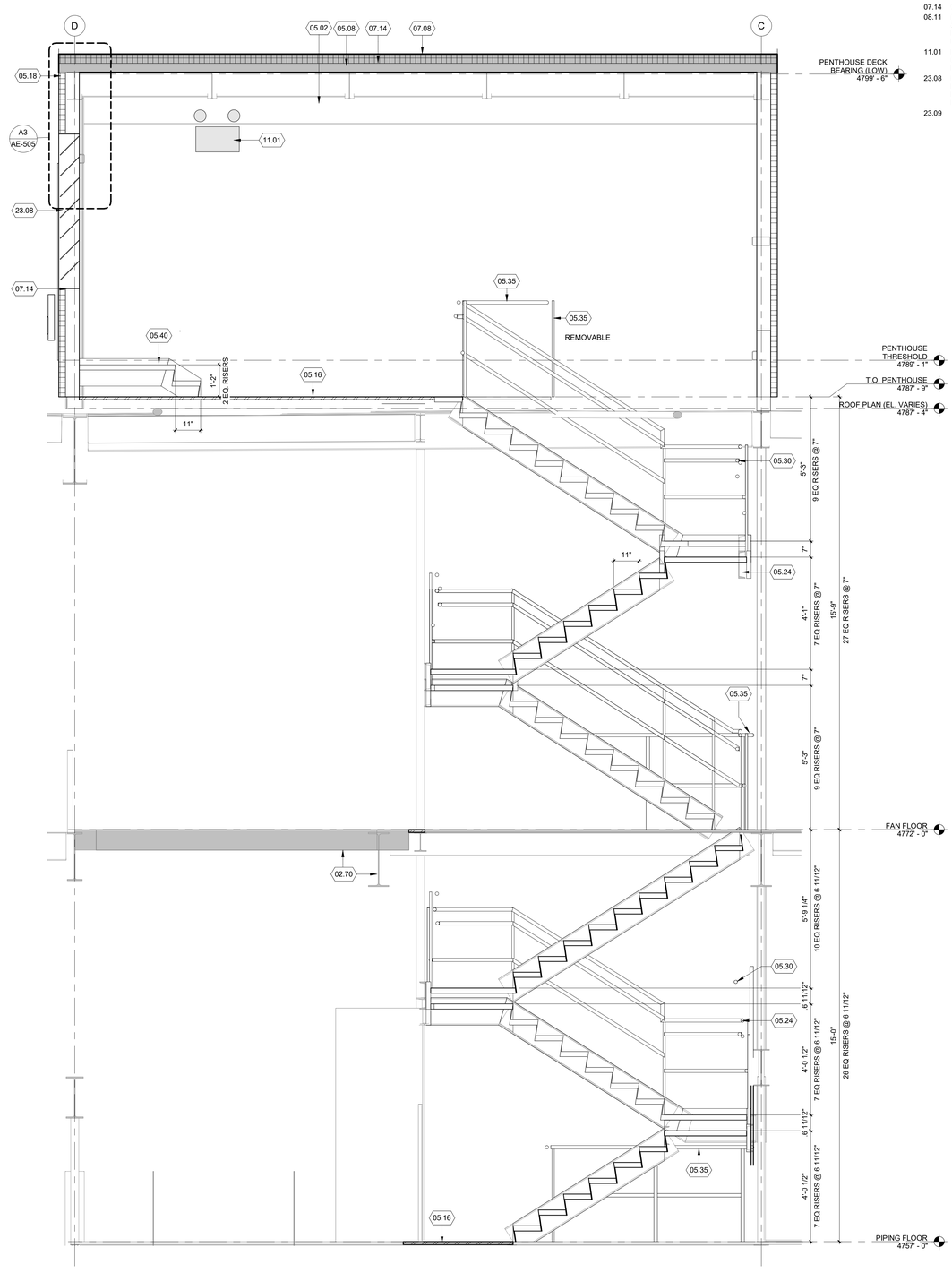
AE-401-3



NOTE: MECHANICAL EQUIPMENTS ARE NOT SHOWN FOR CLARITY

A2 STAIRS N-S001 SECTION

SCALE: 1/2" = 1'-0"



NOTE: MECHANICAL EQUIPMENTS ARE NOT SHOWN FOR CLARITY

A4 STAIRS N-S001 SECTION

SCALE: 1/2" = 1'-0"

REFERENCE NOTES

02.70	EXISTING STRUCTURAL BEAM, COLUMN, FLOOR
05.08	METAL ROOF DECKING
05.16	NEW METAL FLOOR GRATE, RE. STR. DWG. FOR SUPPORT DETAIL
05.18	3" INSULATED METAL PANEL TO SPAN VERTICALLY, WITH STEEL FRAME ATTACHED TO EXISTING STRUCTURE
05.24	42" HIGH GUARDRAIL, MATCH EXISTING DESIGN, PAINTED
05.30	1 1/2" STEEL HANDRAIL, EXTEND AS REQUIRED, PAINTED
05.35	42" HIGH GUARD RAIL WITH A MID RAIL AND 4" BASE, MATCH EXISTING, PAINTED
05.40	METAL STAIRS, PAINTED, RE. STR. DWG
07.08	SINGLE PLY ROOFING WITH MIN. R 32 INSULATION., 1/4" PER 12" SLOPE INSULATION, NEW METAL B DECK
07.14	WEATHER BARRIER
08.11	(2) 3'-0" X 7'-0" PAINTED HOLLOW METAL DOOR AND FRAME, WITH PASSAGE DOOR HARDWARE (NO LOCKS), MANUAL FLUSH BOLTS ON THE 2ND LEAF
11.01	MECHANICALLY OPERATED 1000 LBS CAPACITY (MIN.) CRANE. ON ROLLERS FOR BACK/FORTH SLIDING (MANUAL)
23.08	FIXED AIR INTAKE LOUVER WITH MECHANICALLY OPERATED DAMPER, RE. MECH. DWG. FOR ACTUAL SIZE AND STR. DWG. FOR SUPPORT
23.09	

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

~~8-23-2021~~

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH
JACKSON FERGUSON, AIA
#5040042-0301
LICENSED ARCHITECT
12-16-2020

△ DATE REVISION

PROJECT NUMBER 18136

PENTHOUSE STAIRS SECTIONS

AE-411-3

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

REVISION	DATE
2 Phase 3 PR #4	5-3-2021

PROJECT NUMBER 18136

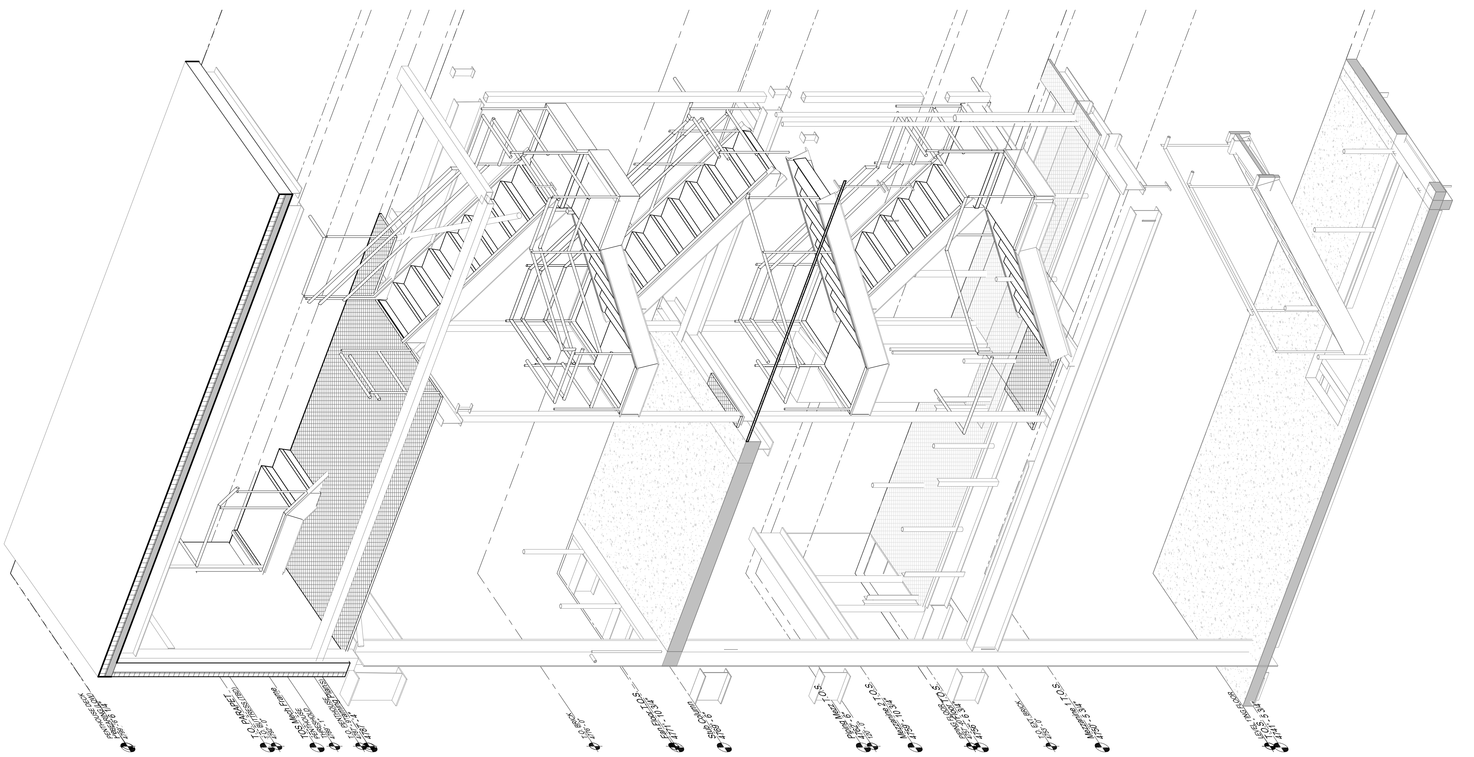
PENTHOUSE STAIRS ISOMETRIC

AE-412-3

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

8/20/2021

REFERENCE NOTES



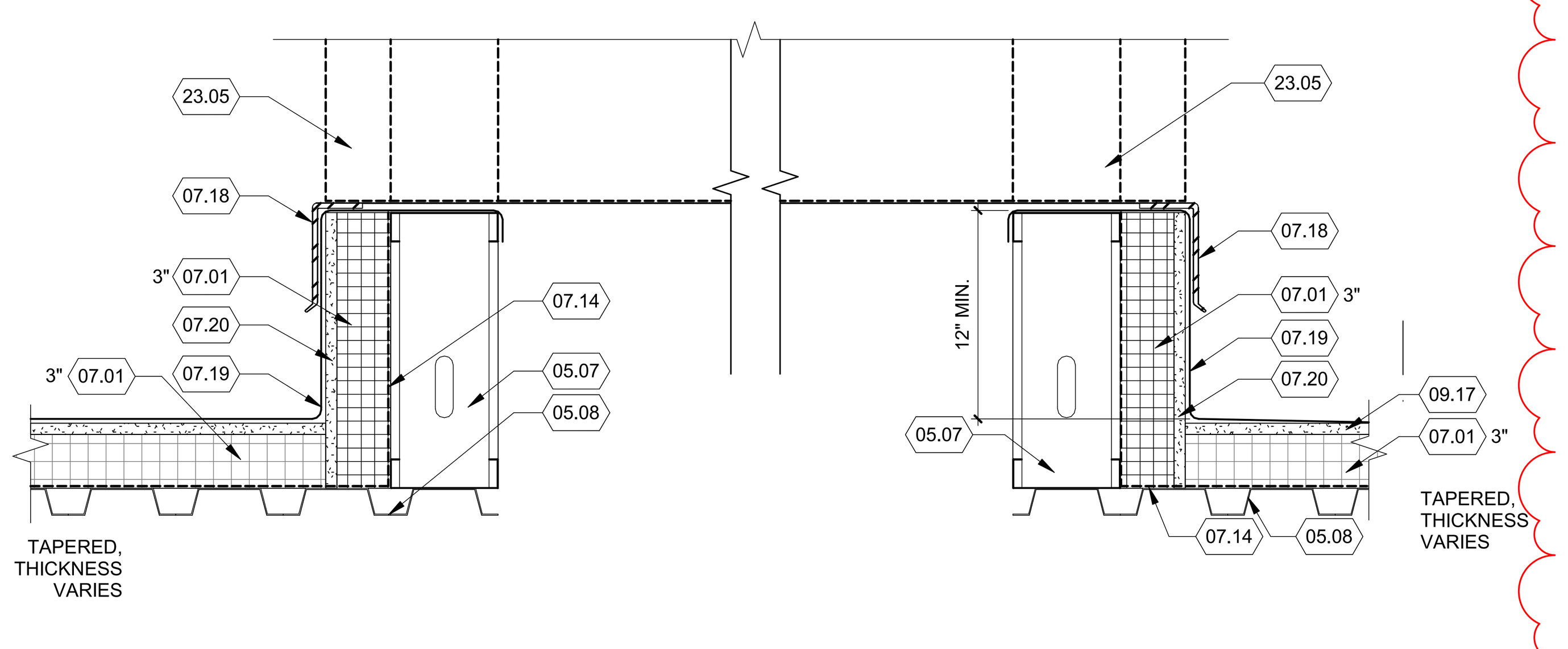
A5 PENTHOUSE STAIRS ISOMETRIC

SCALE:

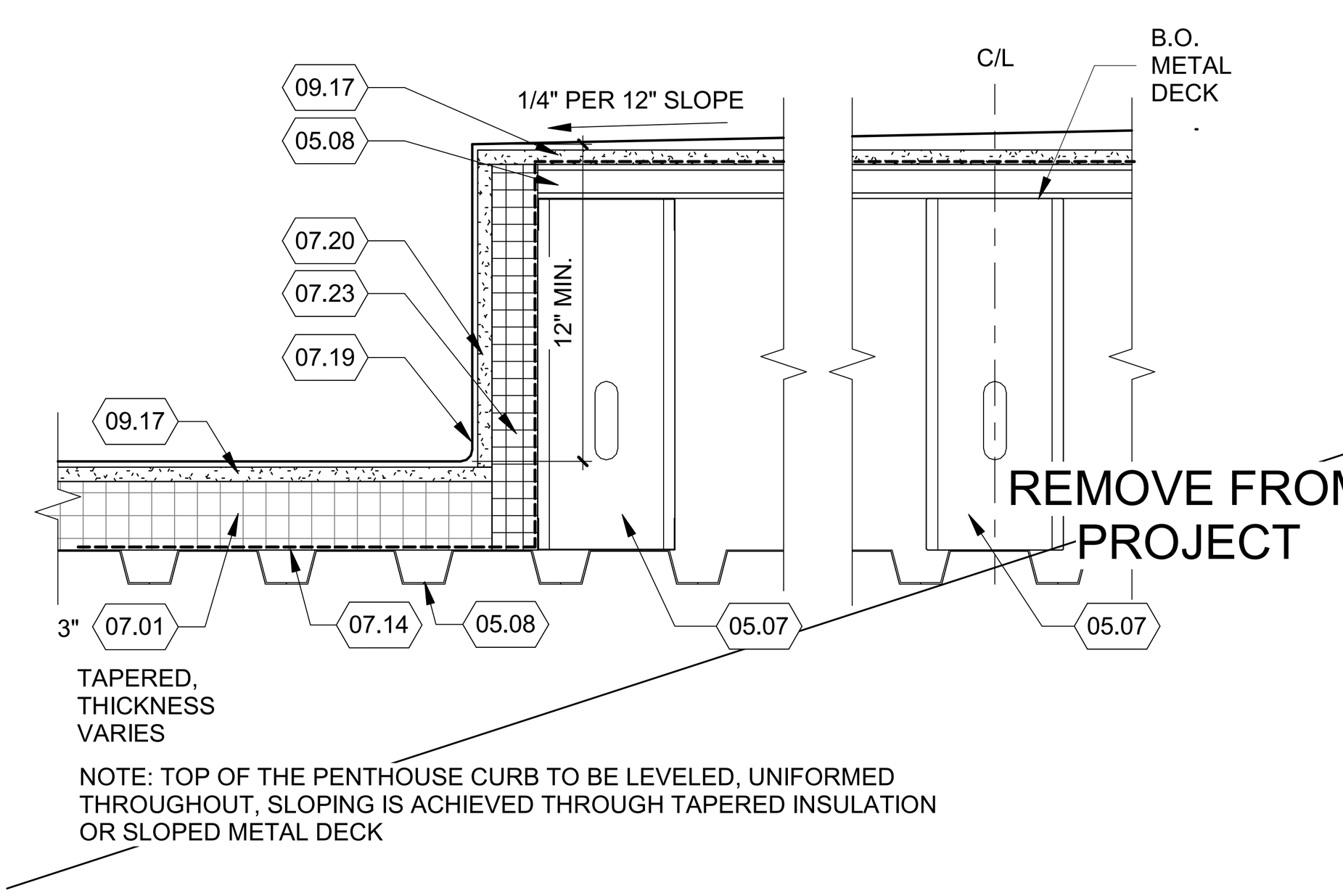
05/18/2022 3:08:44 PM

8/20/2021 2:48:11 PM

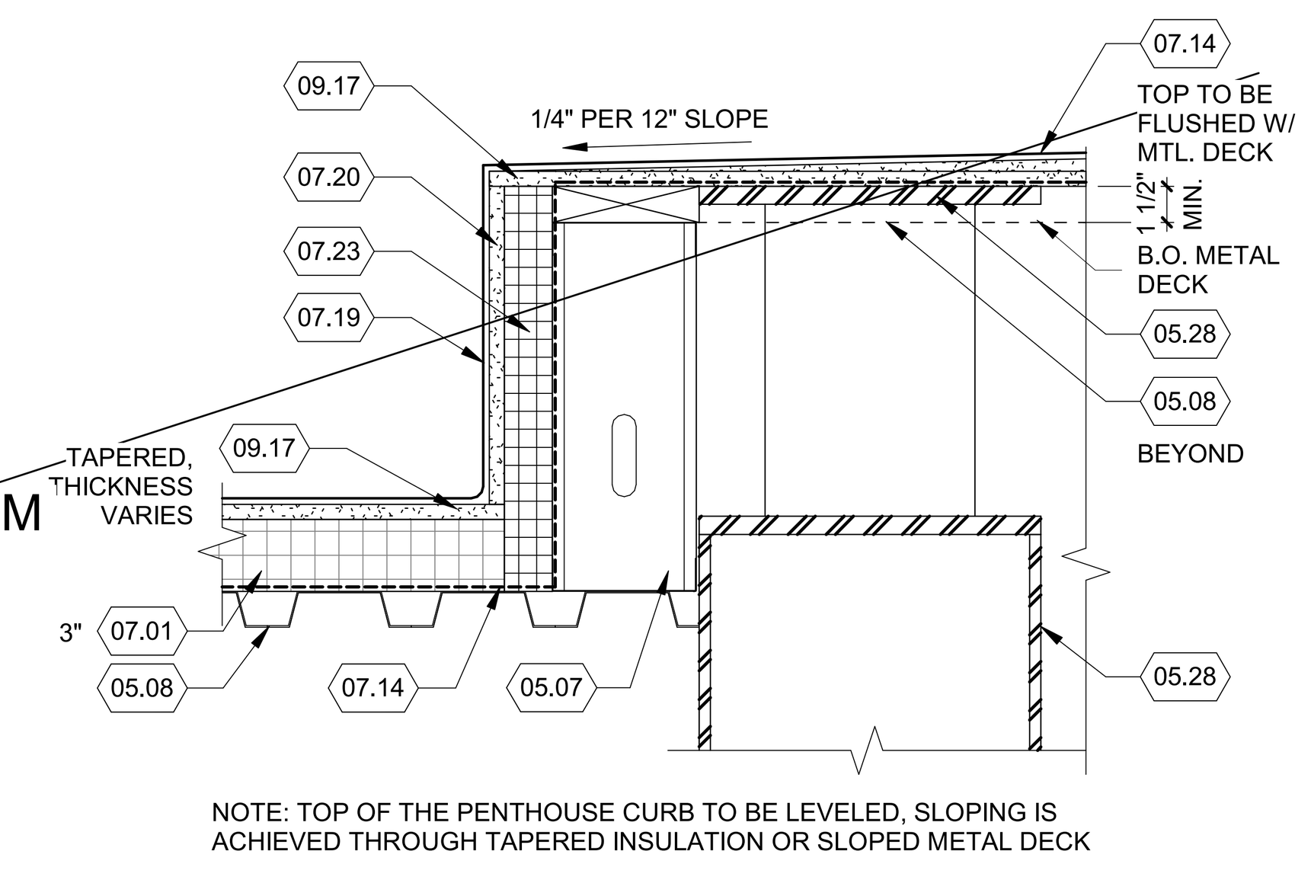
05/18/2022 3:08:44 PM



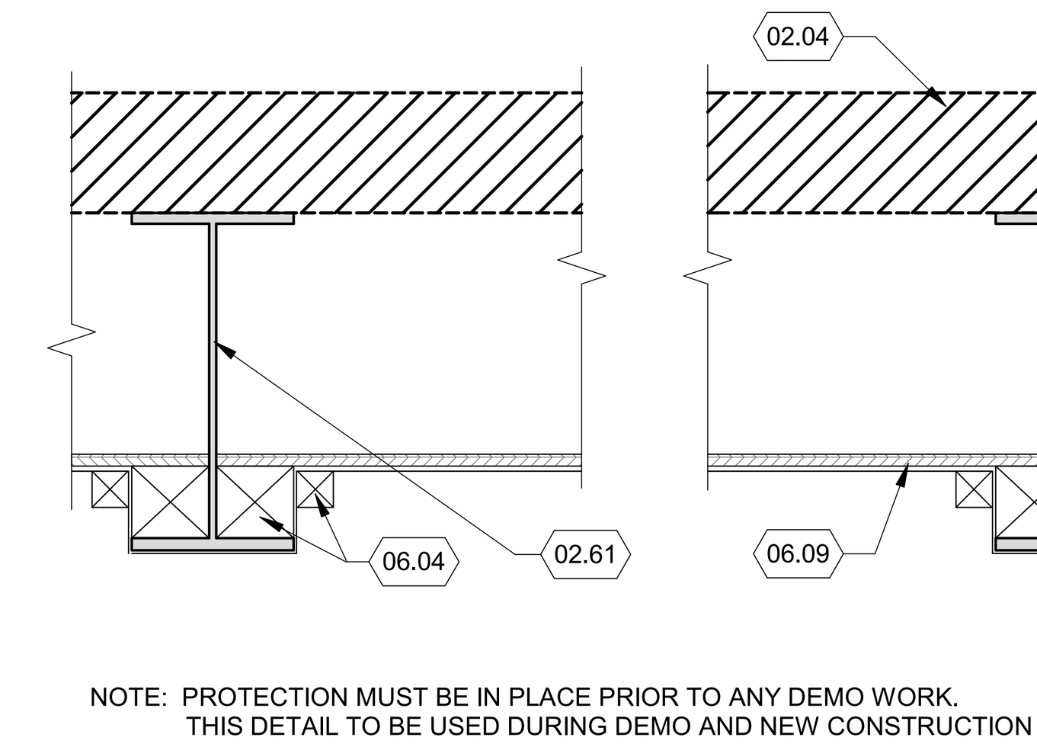
D1 ROOF CURB DETAIL - PHASE 2
SCALE: 1 1/2" = 1'-0"



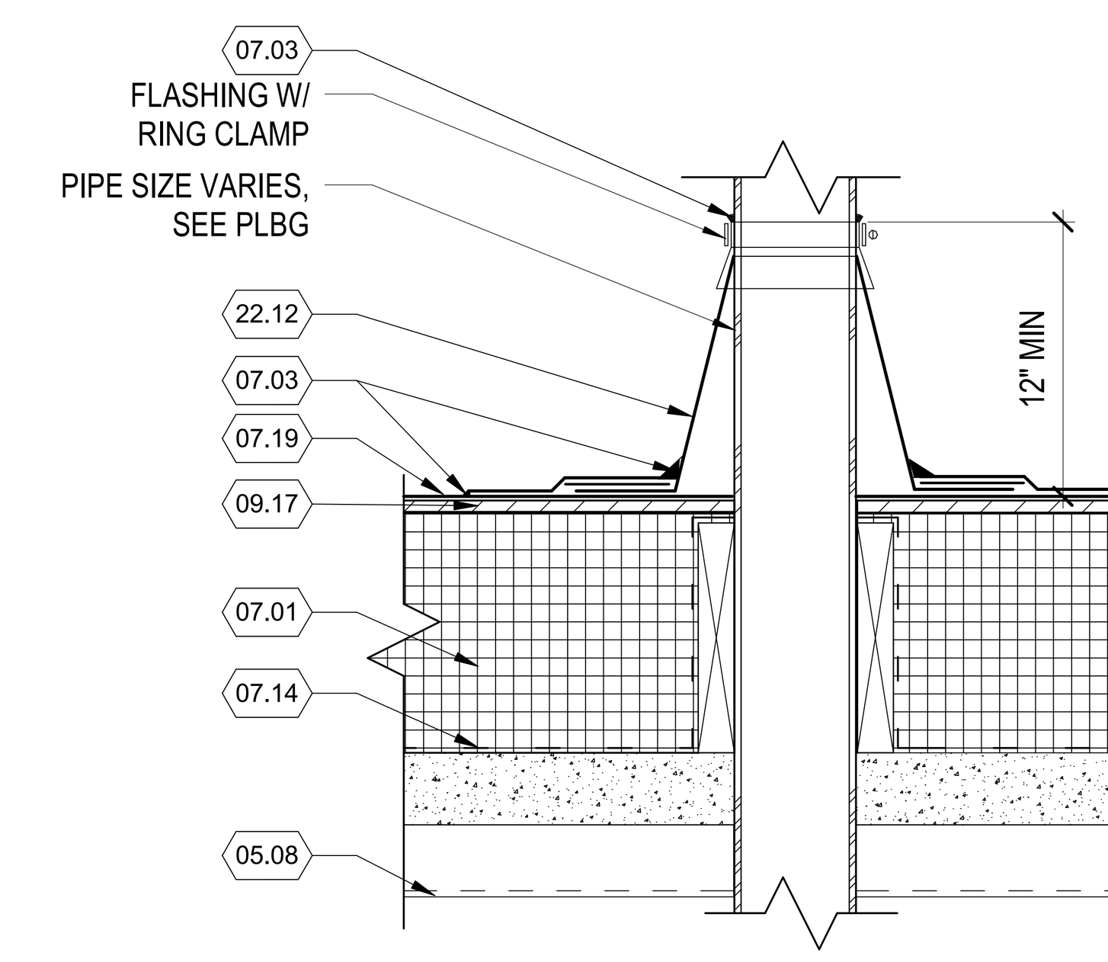
D3 PENTHOUSE CURB
SCALE: 1 1/2" = 1'-0"



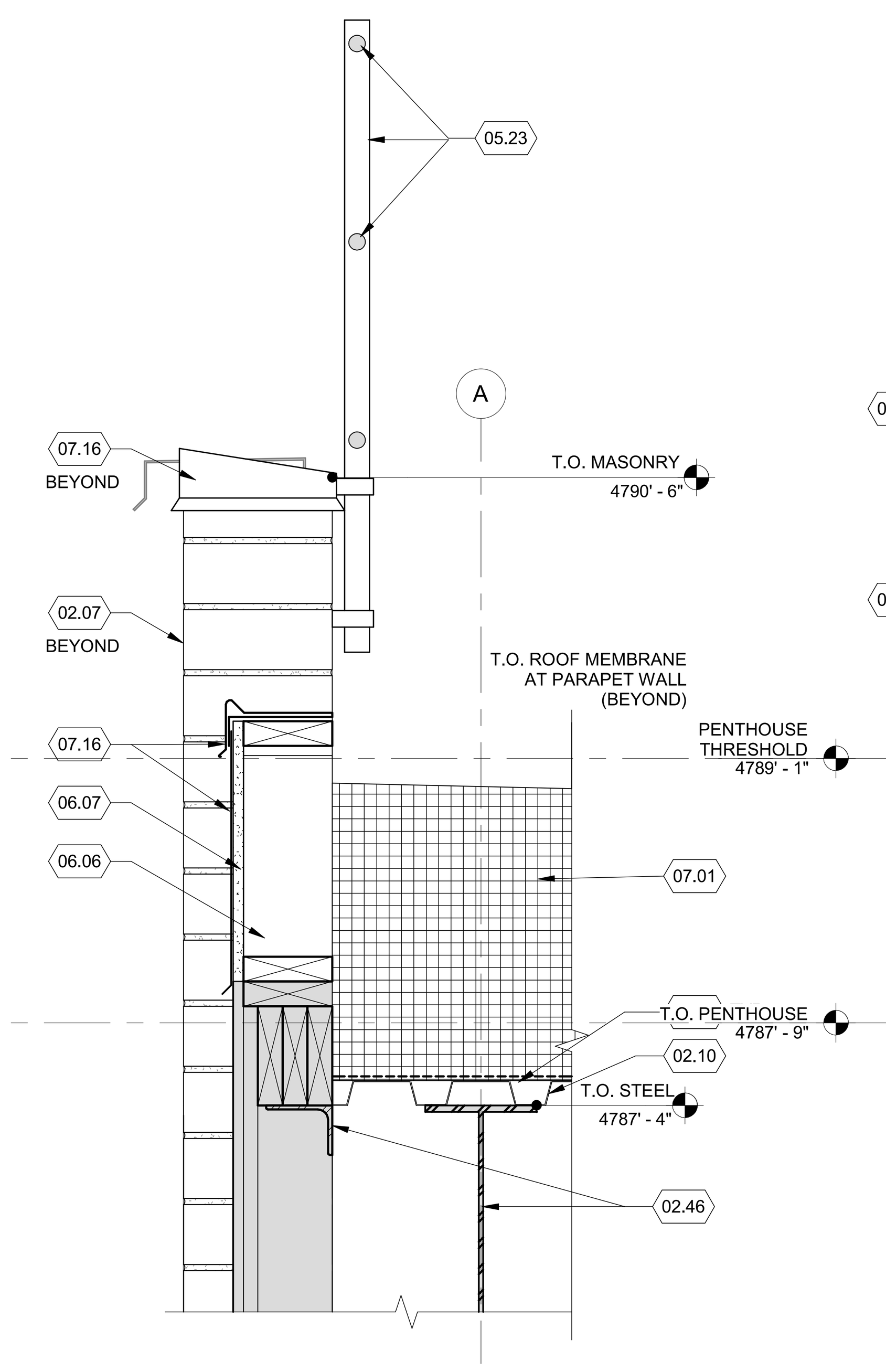
D4 PENTHOUSE CURB @ CORNER
SCALE: 1 1/2" = 1'-0"



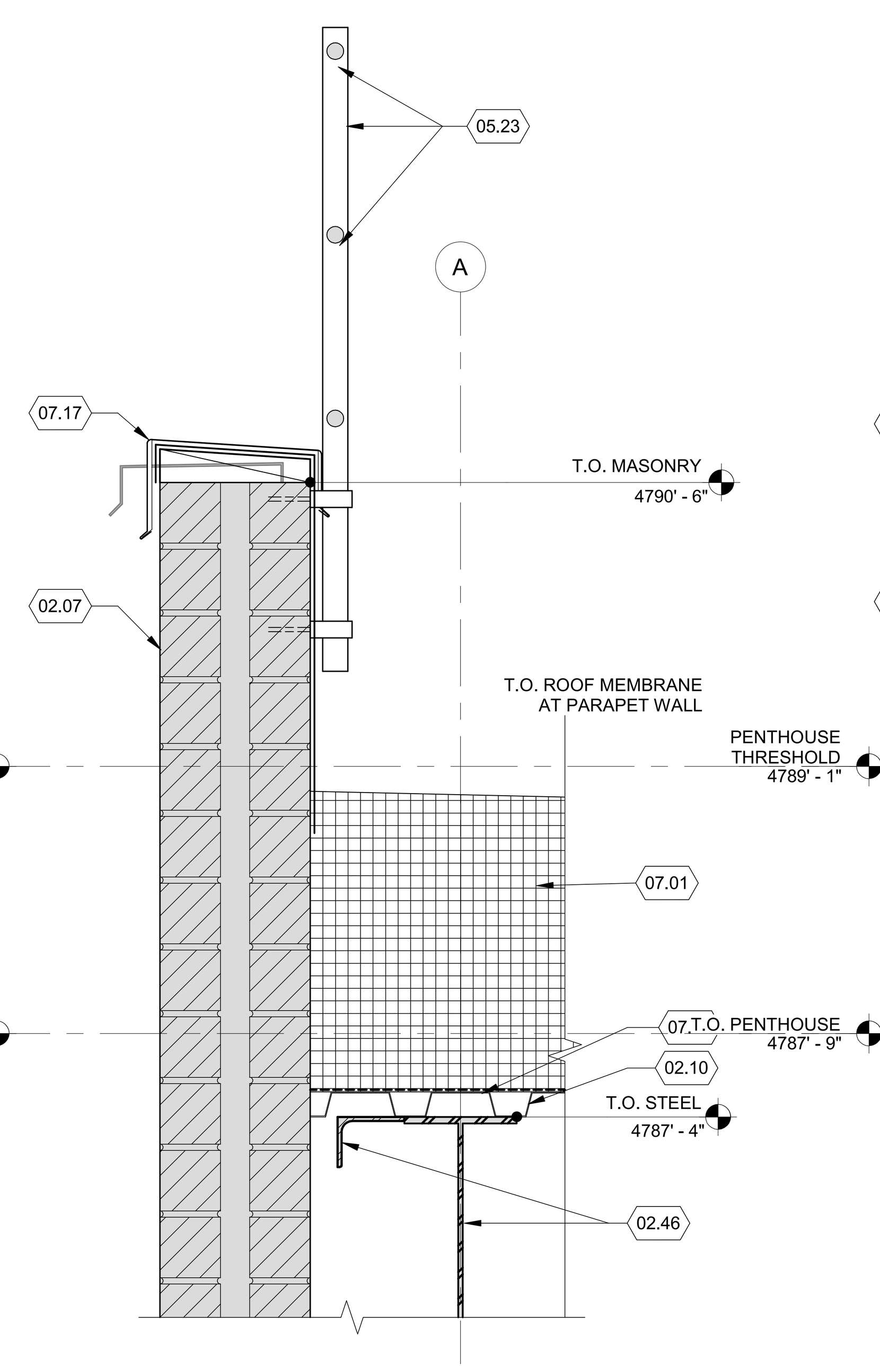
D5 ELEC. ROOM PROTECTION
SCALE: 1 1/2" = 1'-0"



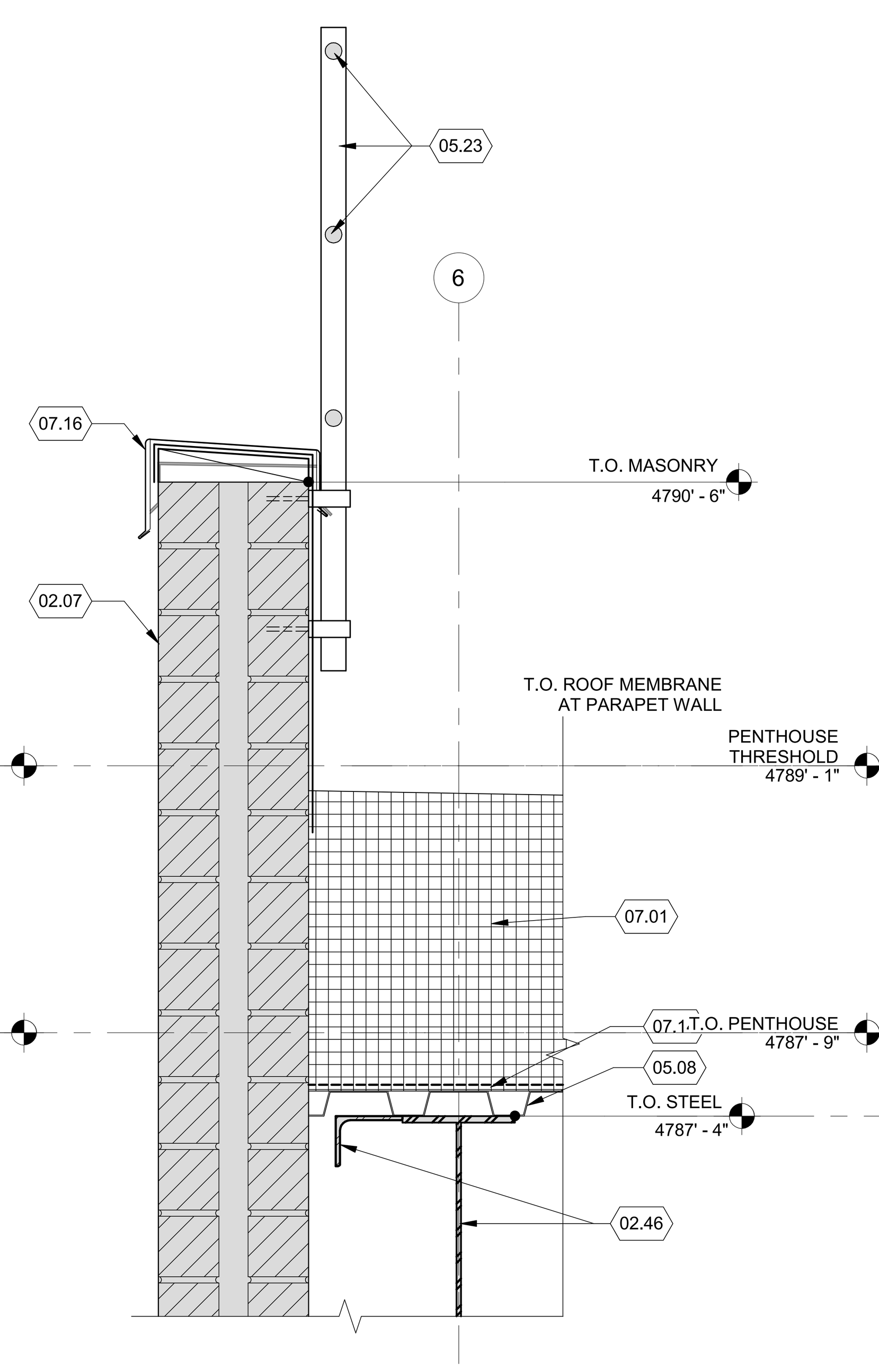
C5 TYP. PENETRATION PIPE FLASHING
SCALE: 1 1/2" = 1'-0"



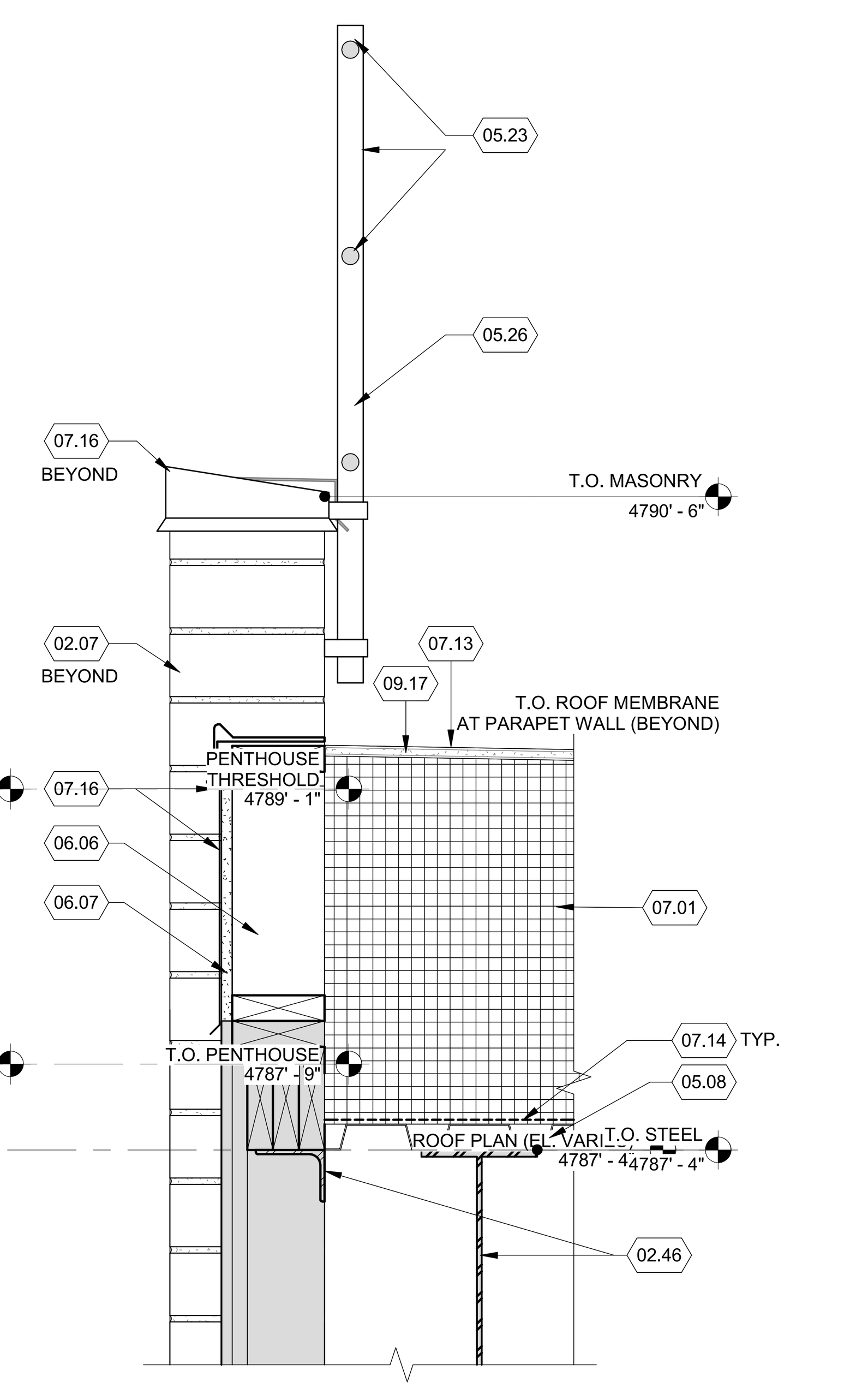
B1 PARAPET SECTION GRIDS A-B (ABOVE EXISTING WINDOWS) PH.2
SCALE: 1 1/2" = 1'-0"



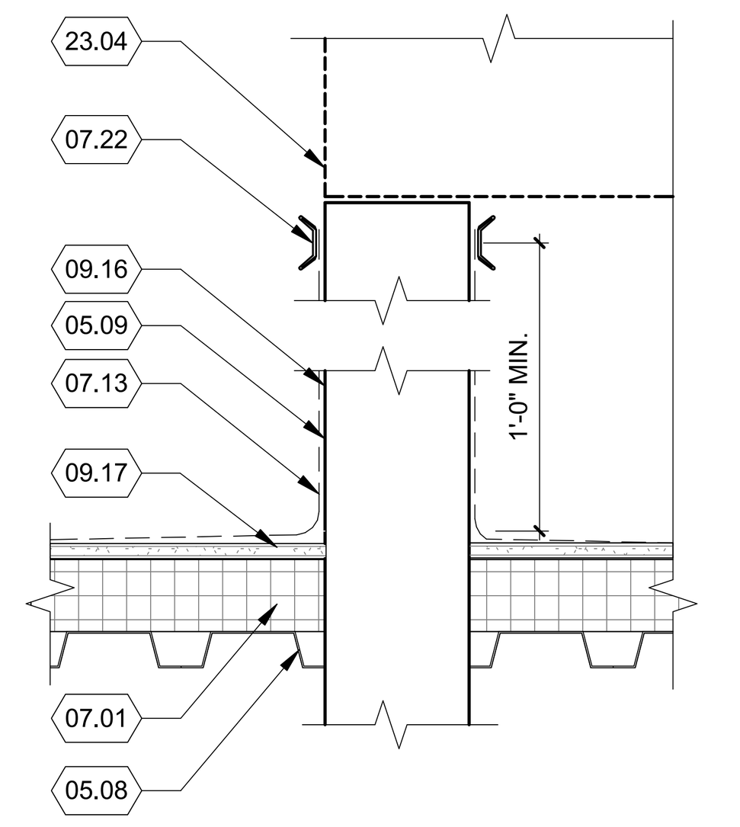
B2 PARAPET SECTION GRIDS A-B PH.2
SCALE: 1 1/2" = 1'-0"



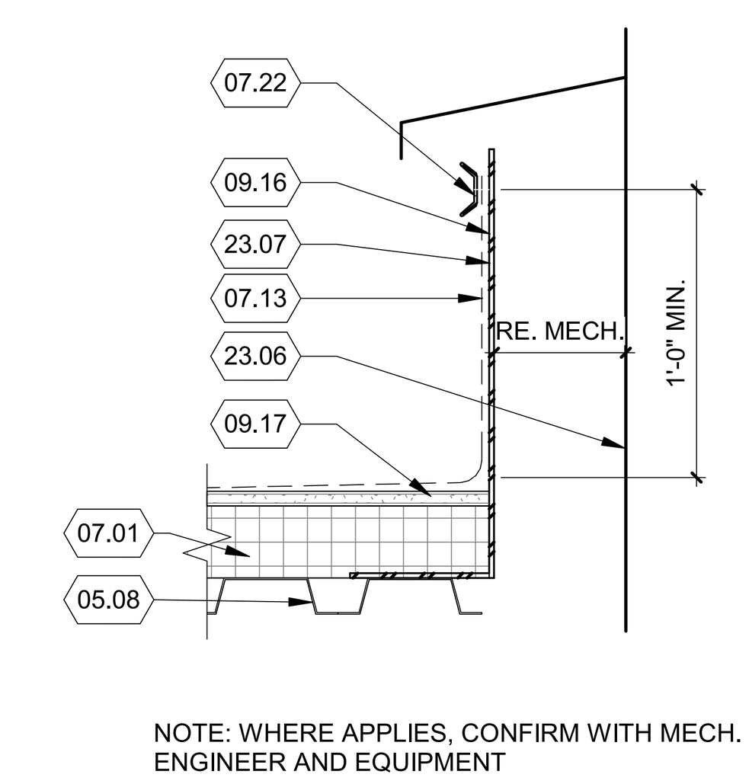
B3 PARAPET SECTION GRIDS PH.2
SCALE: 1 1/2" = 1'-0"



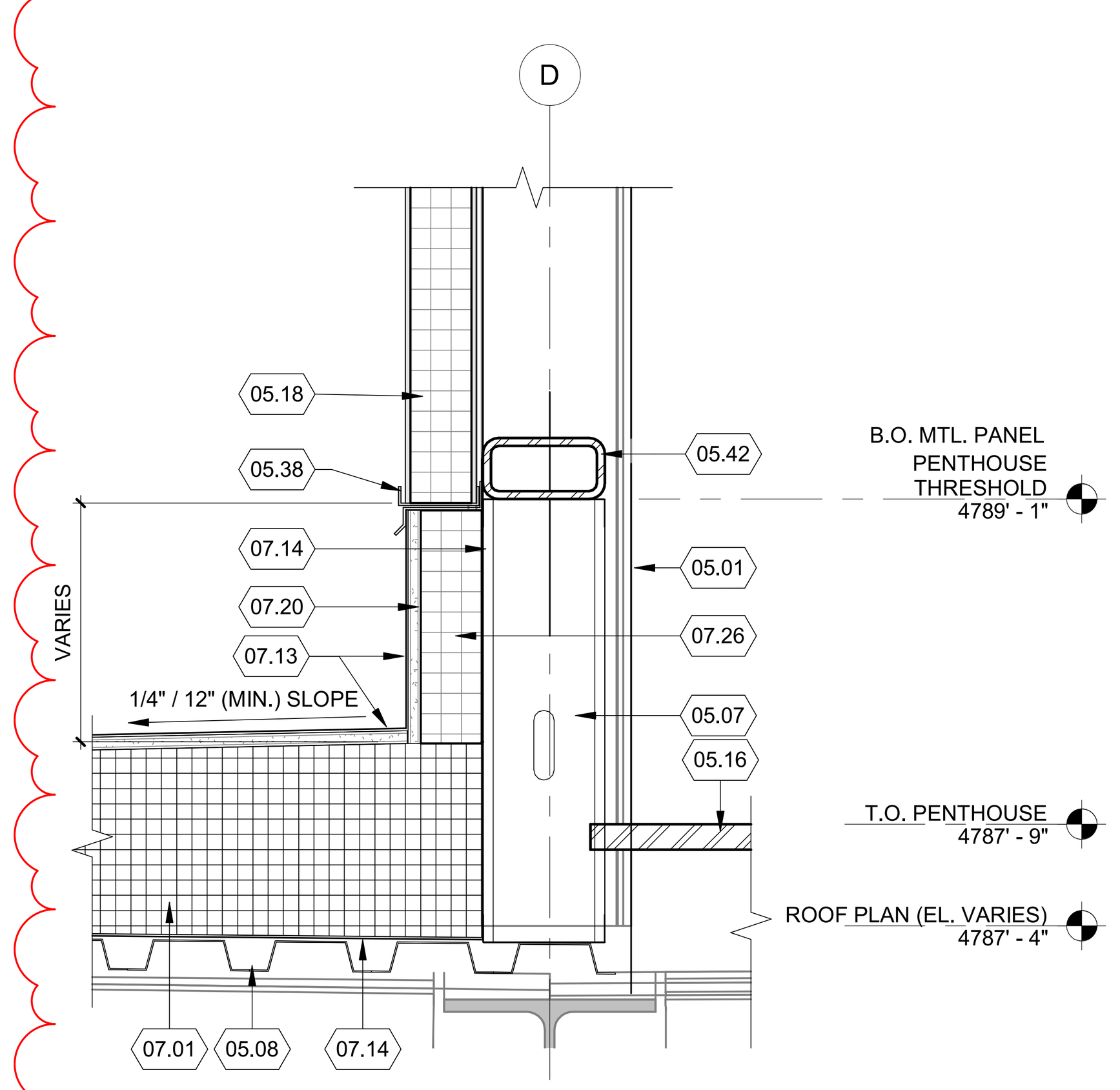
B4 PARAPET SECTION AT WALL OPENING PH.2
SCALE: 1 1/2" = 1'-0"



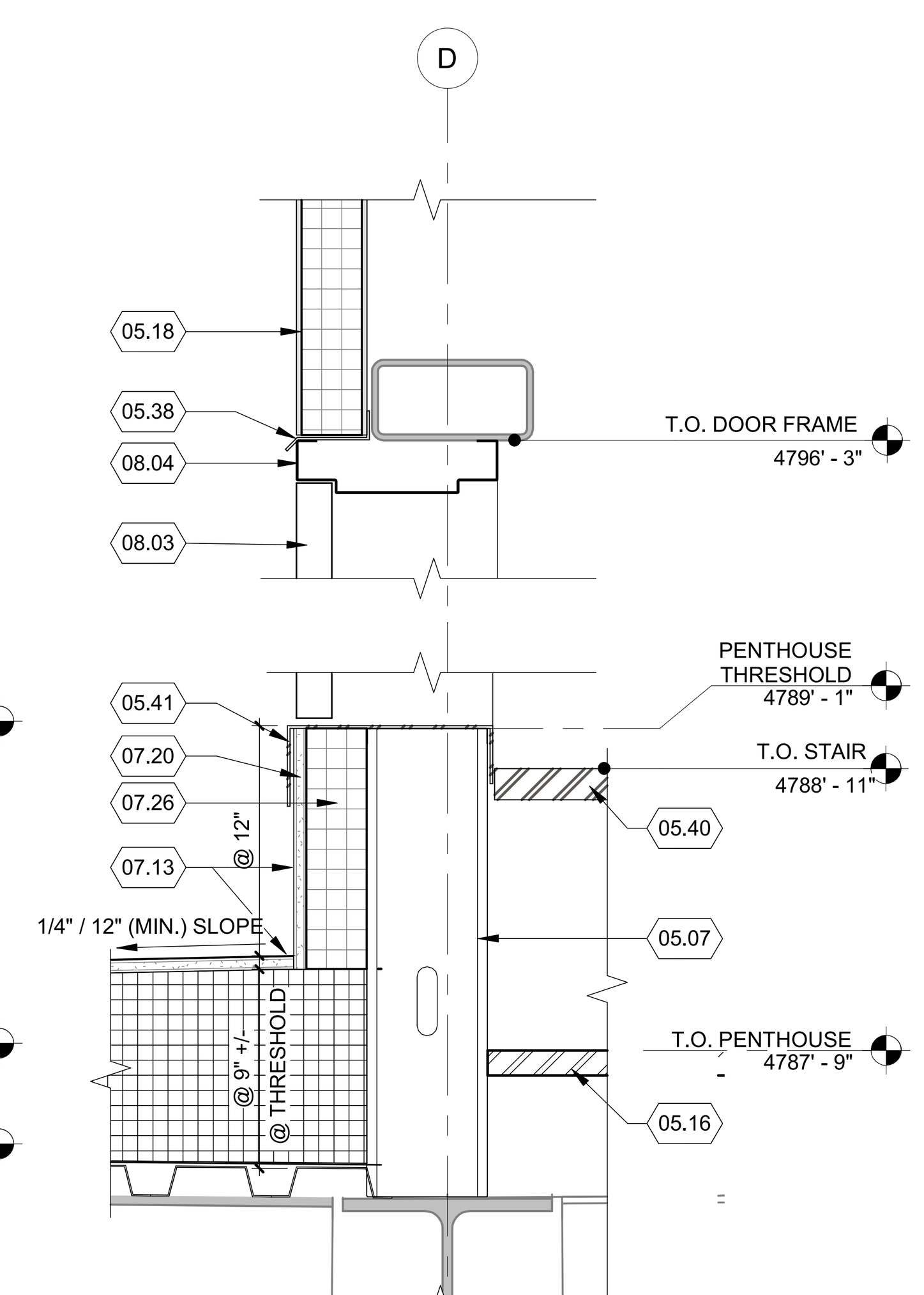
B5 ROOF POST DETAIL
SCALE: 1 1/2" = 1'-0"



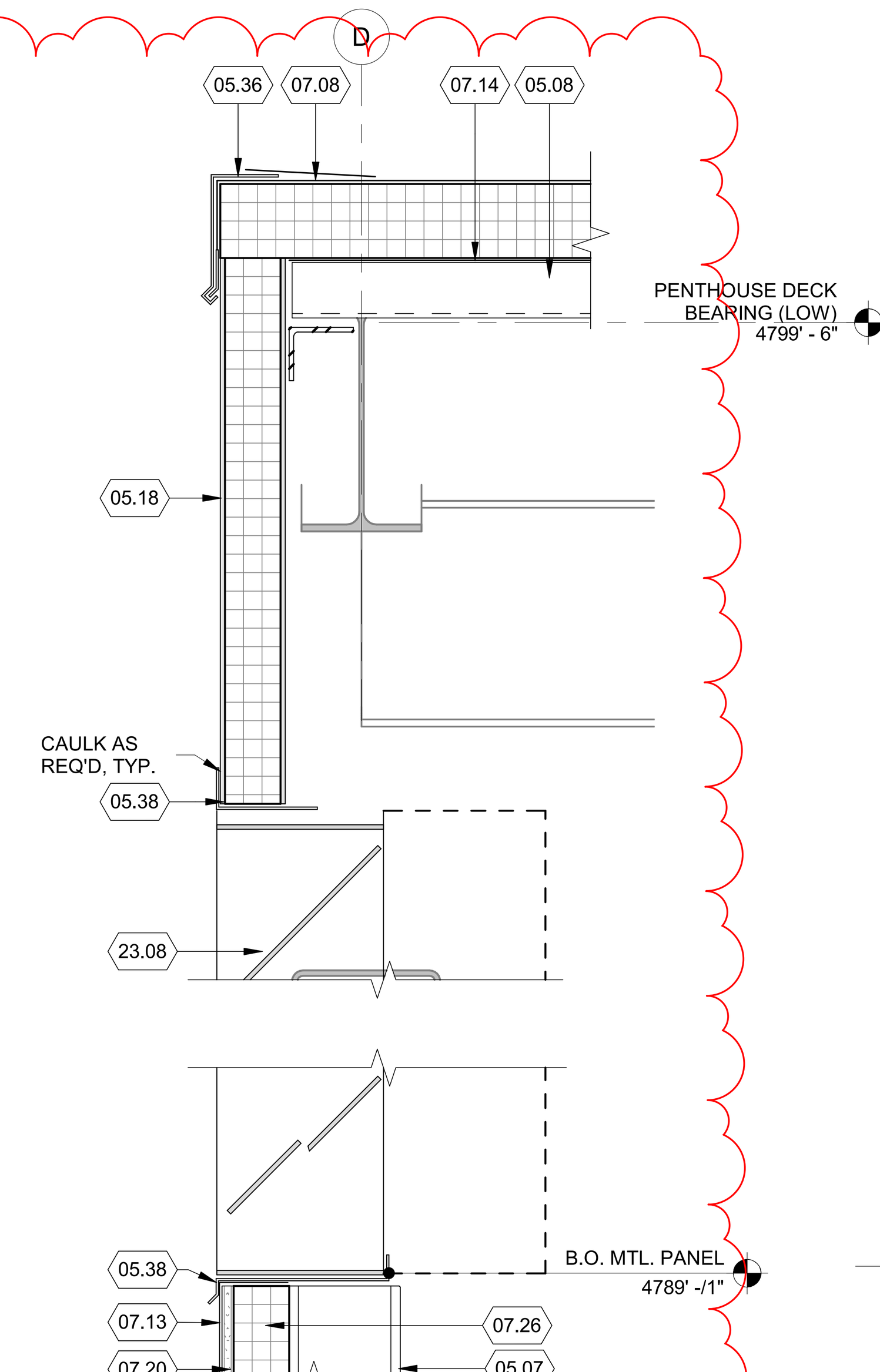
B6 ROOF EXHAUST DETAIL
SCALE: 1 1/2" = 1'-0"



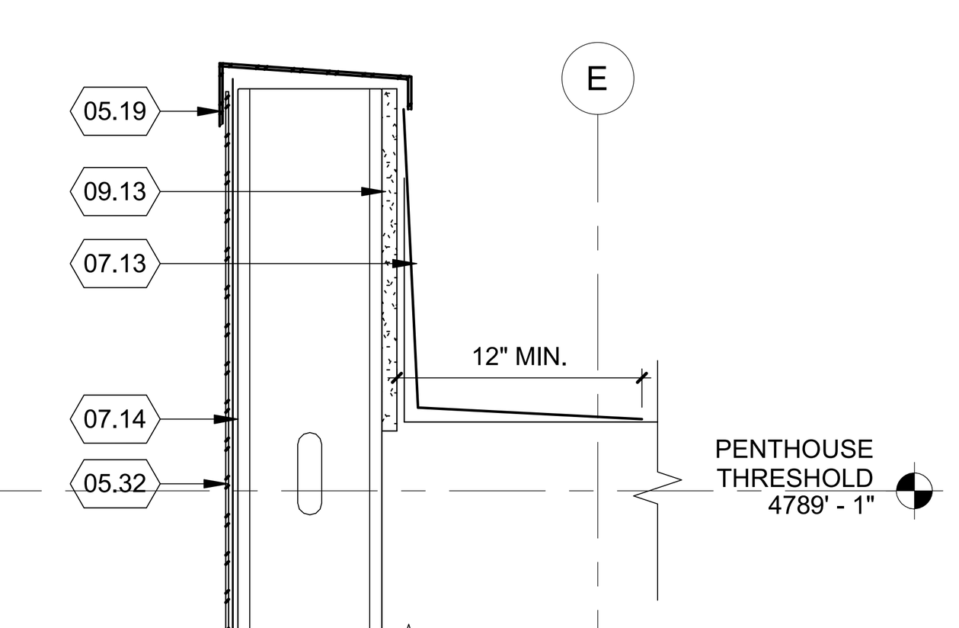
A1 PENTHOUSE WALL DETAIL
SCALE: 1 1/2" = 1'-0"



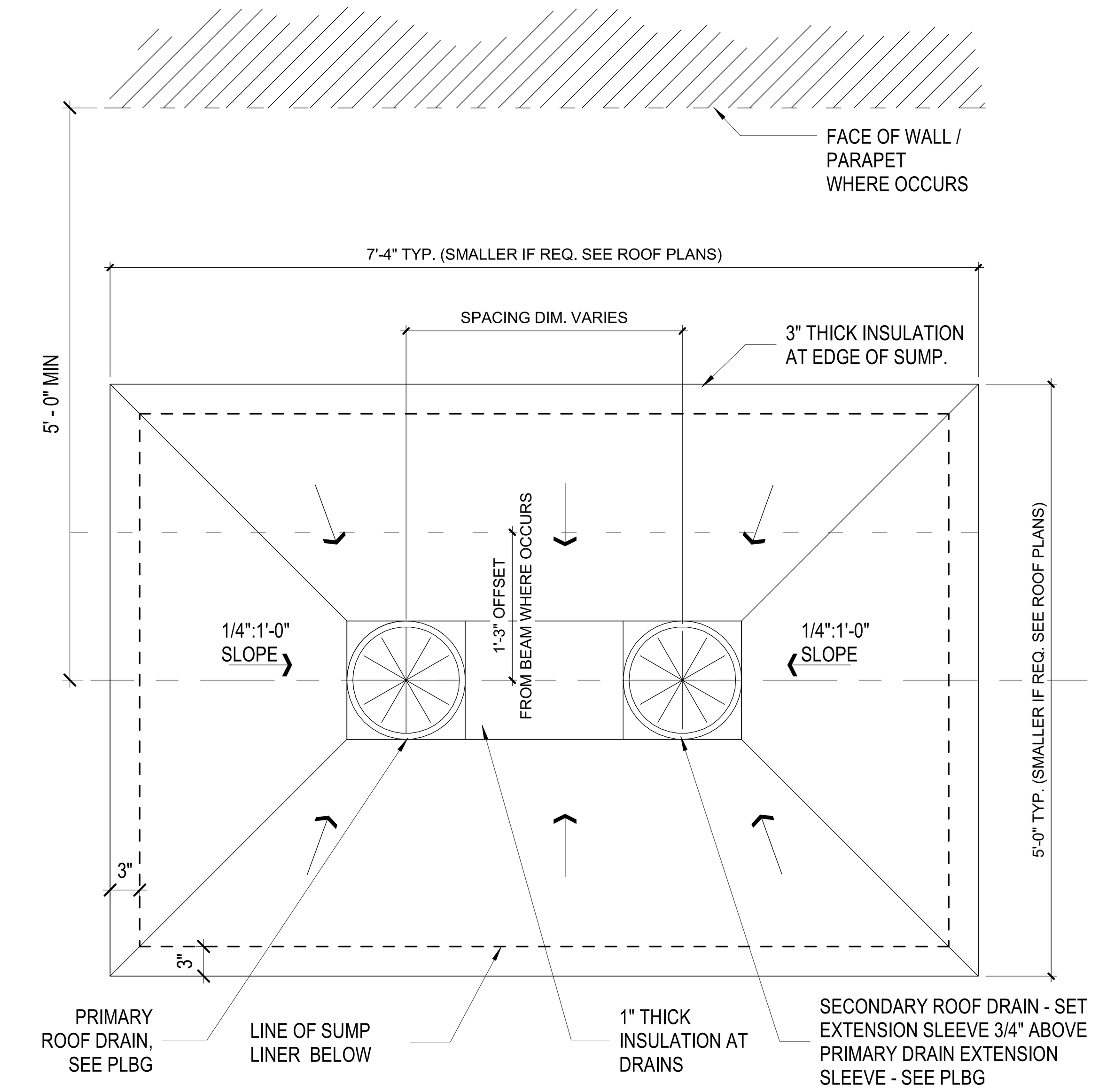
A2 DOOR HEAD/THRESHOLD
SCALE: 1 1/2" = 1'-0"



A3 PENTHOUSE WALL DETAIL
SCALE: 1 1/2" = 1'-0"



A4 PARAPET DETAIL
SCALE: 1 1/2" = 1'-0"



A5 TYP ROOF/OVERFLOW DRAIN SUMP
SCALE: 1" = 1'-0"

REFERENCE NOTES

- 02.04 REMOVE EXISTING ROOFING, INSULATION, AND DECKING BELOW FROM GRID B TO E
- 02.07 EXISTING MASONRY WALL TO REMAIN
- 02.10 EXISTING DECKING TO REMAIN FROM GRID A TO B
- 02.46 EXISTING STRUCTURE TO REMAIN
- 02.61 EXISTING STEEL TO REMAIN
- 05.01 STRUCTURAL COLUMN, PRIMED & PAINTED
- 05.07 6" METAL STUD
- 05.08 METAL ROOF DECKING
- 05.09 STEEL TUBE
- 05.16 NEW METAL FLOOR GRATE, RE. STR. DWG. FOR SUPPORT DETAIL
- 05.18 3" INSULATED METAL PANEL TO SPAN VERTICALLY, WITH STEEL FRAME ATTACHED TO EXISTING STRUCTURE
- 05.19 PREPAINTED METAL PARAPET CAP
- 05.23 OSHA COMPLIANT WALL MOUNT WIRE ROPE GUARDRAIL
- 05.26 2" X 2" ANGLE (PT). ANCHOR TO WALL
- 05.28 STEEL STUB, RE. STR. DWG.
- 05.32 24 GAUGE PREPAINTED METAL PANEL (COLOR TO MATCH EXISTING) WITH EXPOSED FASTENER, CAULKING AND CLOSURE ANGLE AT ALL EDGES
- 05.36 PAINTED METAL DRIP EDGE, FULLY ADHERED AT ALL HORIZONTAL ROOF SURFACE, MECHANICALLY FASTEN OTHERWISE
- 05.38 PAINTED METAL PANEL CLOSURE TRIM, COLOR TO MATCH, TYP AT ALL CONNECTION POINTS
- 05.40 METAL STAIRS, PAINTED, RE. STR. DWG
- 05.41 ALUMINUM DIAMOND PLATE
- 05.42 PAINTED STRUCTURAL SUPPORT, RE. STRU. DWG.
- 06.04 WOOD BLOCKING
- 06.06 EXTERIOR ROUGH CARPENTRY
- 06.07 EXTERIOR GYPSUM SHEATHING
- 06.09 1/2" PLYWOOD
- 07.01 RIGID ROOF INSULATION. MIN. R 32,, THICKNESS VARIES
- 07.03 SEALANT
- 07.08 SINGLE PLY ROOFING WITH MIN. R 32 INSULATION,, 1/4" PER 12" SLOPE INSULATION, NEW METAL B DECK
- 07.13 SINGLE PLY ROOFING
- 07.14 WEATHER BARRIER
- 07.16
- 07.17 SHEET METAL COPING WITH SLOPED BLOCKING
- 07.18 METAL FLASHING WITH DRIP EDGE
- 07.19 SINGLE PLY ROOFING MEMBRANE TO WRAP OVER CURB WALL
- 07.20 5/8" EXTERIOR GLASS MAT SHEATHING
- 07.22 GALVANIZED TERMINATION BAR WITH CAULKING ON ALL SIDES
- 07.23 2" RIGID INSULATION
- 07.26 3" RIGID INSULATION
- 08.03 NEW DOOR. SEE DOOR SCHEDULE
- 08.04 DOOR FRAME
- 09.13 5/8" EXTERIOR GYPSUM SHEATHING
- 09.16 PAINT, AS REQ'D
- 09.17 5/8" COVER BOARD
- 22.12 ELASTOMERIC PIP BOOT
- 23.04 ROOFTOP EQUIPMENT
- 23.05 FUTURE MECHANICAL UNIT. RE: MECHANICAL DRAWINGS
- 23.06 MECHANICAL EXHAUST STACK, RE. MECH. DWG.
- 23.07 MECHANICAL EXHAUST STEEL COLLAR AS REQ'D
- 23.08 FIXED AIR INTAKE LOUVER WITH MECHANICALLY OPERATED DAMPER, RE. MECH. DWG. FOR ACTUAL SIZE AND STR. DWG. FOR SUPPORT

GENERAL NOTES

1. SHORE ALL ROOF TOP EQUIPMENT, PIPES, ETC., AS REQUIRED
2. REFER TO MEP DRAWINGS FOR ADDITIONAL INFORMATION
3. TAPERED INSULATION IS REQUIRED AT THE ROOF LEVEL TO ACHIEVE SLOPES INDICATED ON ROOF PLAN
4.

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on 5/17/2022

~~8-23-2021~~

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH · JACKSON FERGUSON, MA · #5340042-0301 · LICENSED ARCHITECT · 12.15.2020

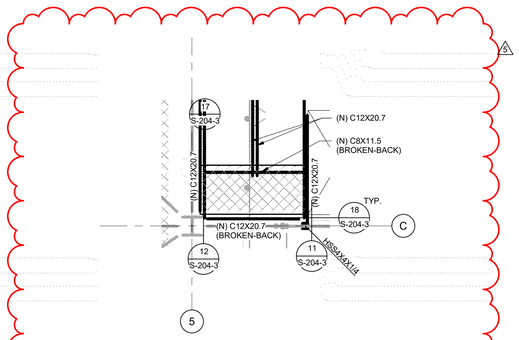
△	DATE	REVISION
1	1-21-2021	Add #4/Checker Comments
2	5-3-2021	Phase 3 PR #4

PROJECT NUMBER 18136

ROOF DETAILS

AE-505

8/20/2021 2:48:11 PM



STAIR LANDING FRAMING PLAN — B / S-102-3

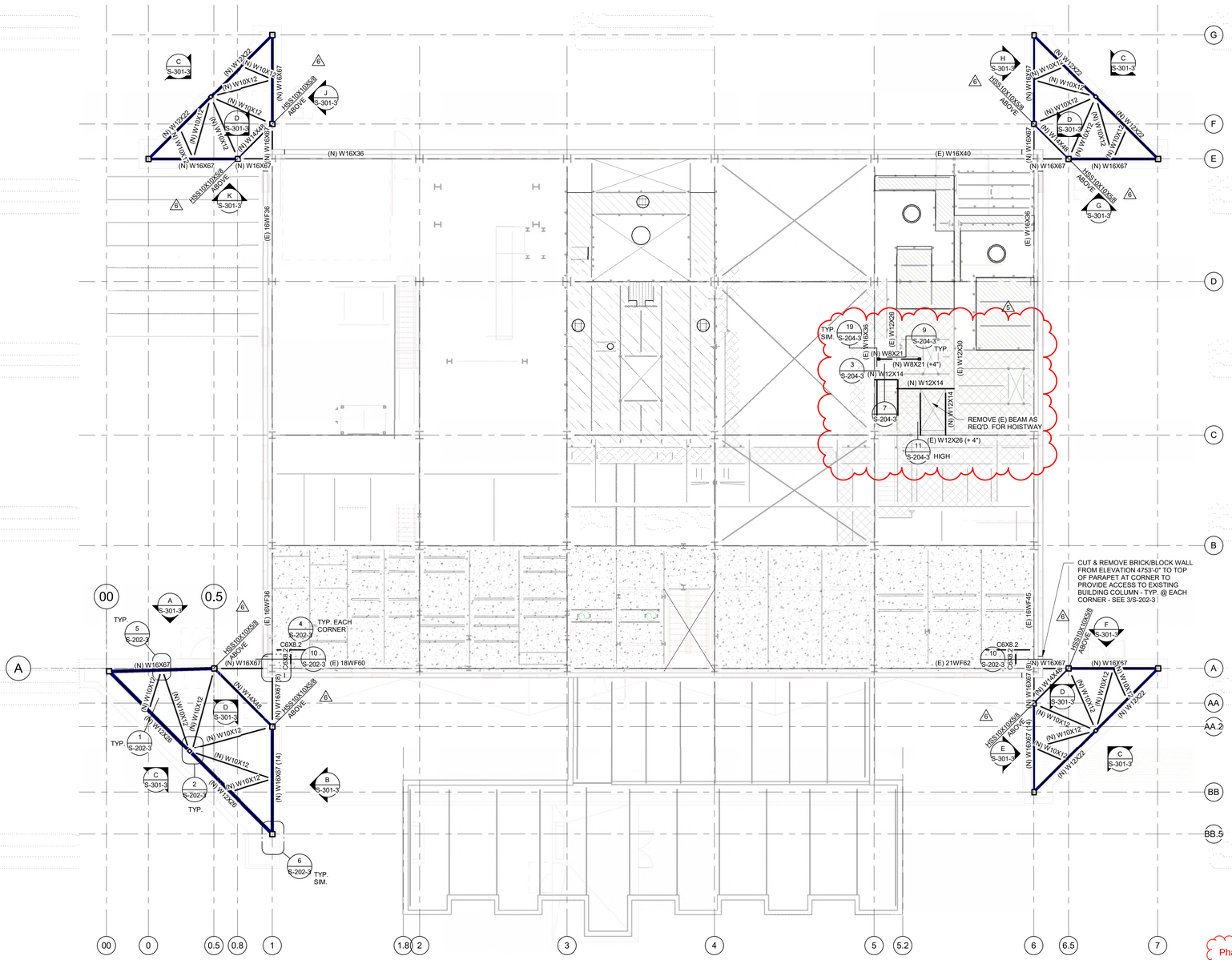
SCALE : 1/4" = 1'-0"

PIPING FLOOR FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL IS 4756' - 6 3/4" U.N.O. (FIELD VERIFY) - FINISHED FLOOR ELEVATION IS 4757' - 0" (FIELD VERIFY)
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. = EXISTING GRATING
4. = EXISTING SUSPENDED CONCRETE SLAB
5. = NEW GRATING

FLOOR FRAMING NOTES:

1. SEE SHEET SG-001 FOR GENERAL STRUCTURAL NOTES
2. SEE TYPICAL BEAM CONNECTION SCHEDULE FOR TYPICAL W BEAM CONNECTIONS THAT ARE NOT SPECIFICALLY DETAILED.
3. SEE 10/S-202-3 FOR FRAMING AROUND SUSPENDED CONCRETE SLAB OPENINGS IN EXISTING SUSPENDED SLABS. STEEL FRAMING TO BE INSTALLED PRIOR TO REMOVAL OF CONCRETE.



PIPING FLOOR FRAMING PLAN / OFFICE ROOF FRAMING PLAN - PHASE 3 — A / S-102-3

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

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

~~8-23-2021~~

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 - 2019
ENGINEERS
structural consultants
1394 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436- PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

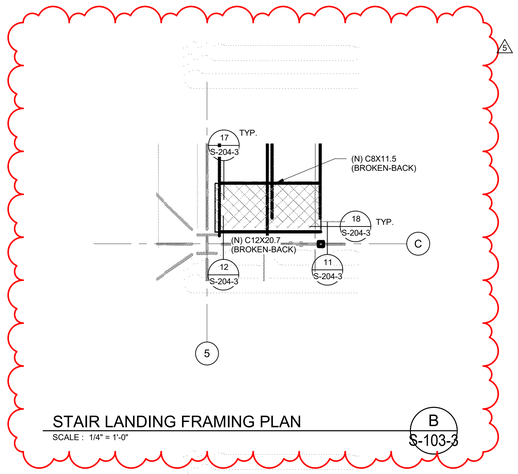
PROFESSIONAL STRUCTURAL ENGINEER
12/10/20
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4
6	4/15/21	PR #3

PROJECT NUMBER 18923

PIPING FLOOR PLAN - PHASE 3

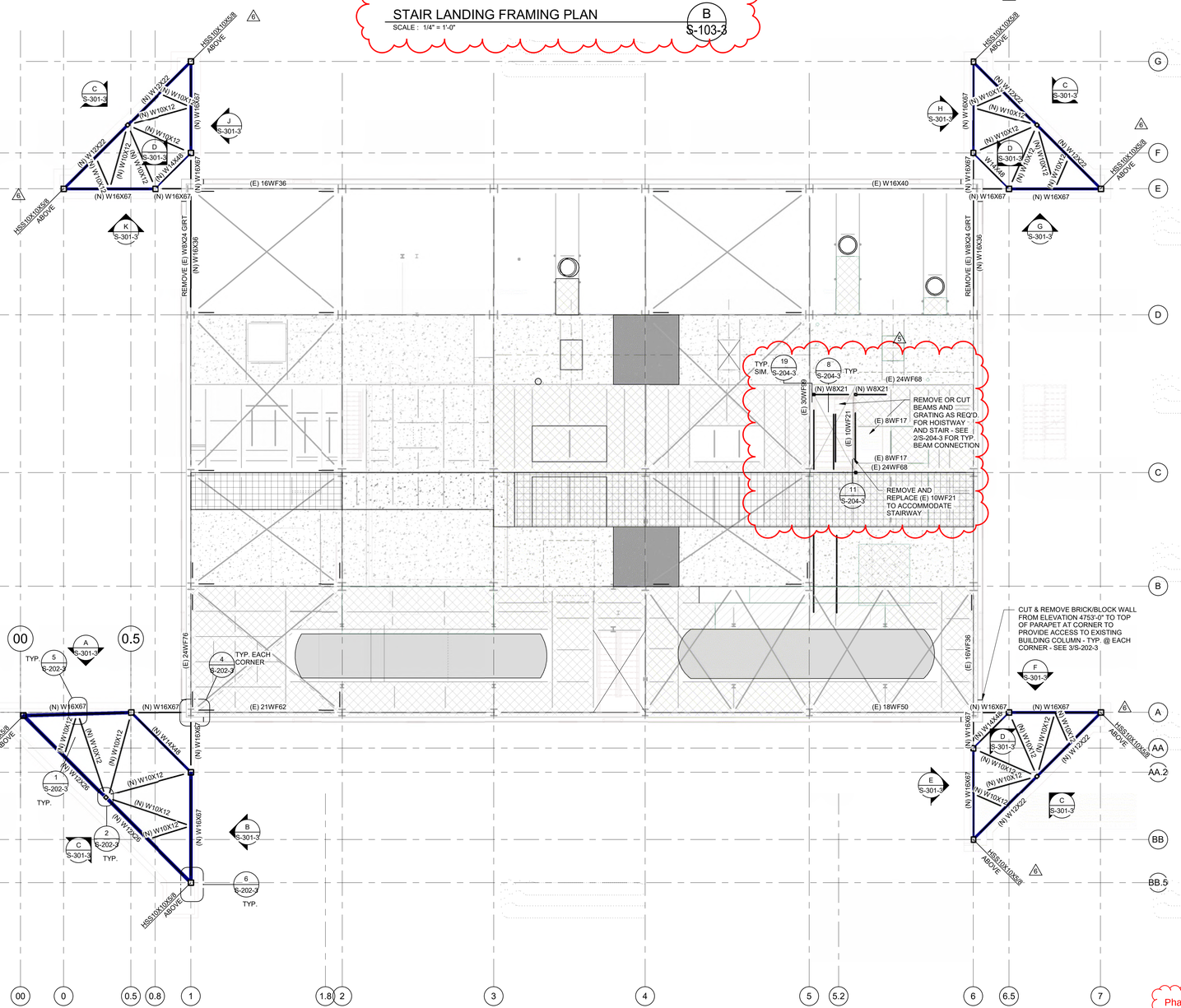
S-102-3



STAIR LANDING FRAMING PLAN
SCALE : 1/4" = 1'-0"
B
S-103-3

FAN FLOOR FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL IS 4771' - 10 3/4" U.N.O. (FIELD VERIFY) - FINISHED FLOOR ELEVATION IS 4772' - 0" (FIELD VERIFY)
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL
3. = EXISTING GRATING
4. = EXISTING SUSPENDED CONCRETE SLAB
5. SEE S-102-3 FOR ADDITIONAL NOTES.



FAN FLOOR FRAMING PLAN
SCALE : 1/8" = 1'-0"
A
S-103-3

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

8-23-2021

NORTH

8/10/2021 8:28:48 AM

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 - 2019
ENGINEERS
structural consultants
1394 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436- PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

PROFESSIONAL STRUCTURAL ENGINEER
12/10/20
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4
6	4/15/21	PR #3

PROJECT NUMBER 18923

FAN FLOOR FRAMING PLAN - PHASE 3

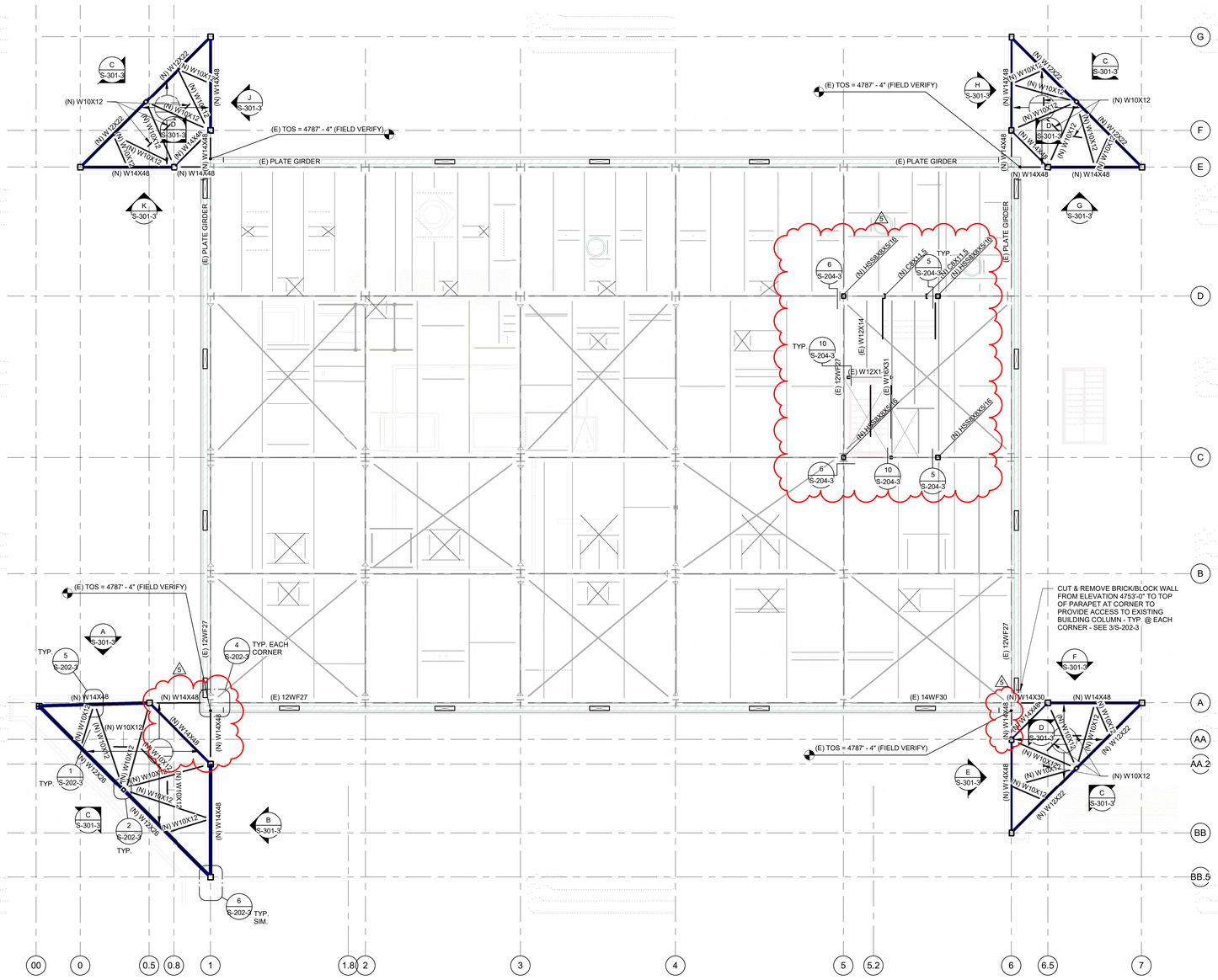
S-103-3

ROOF FRAMING UPGRADE NOTES:

1. TOP OF EXISTING STEEL VARIES - FIELD VERIFY.
2. BEAM DESIGNATION EXAMPLE: (E) C8X11.5 (+4")
   (E) = EXISTING, (N) = NEW
   C8X11.5 = BEAM SIZE
   (+4") = ELEVATION OF TOP OF BEAM IN RELATION TO TOP OF EXISTING STEEL OF CORRESPONDING FRAMING PLAN LEVEL

ROOF FRAMING NOTES:

1. SEE SHEET SG-001 FOR GENERAL STRUCTURAL NOTES.
2. SEE ROOF DECK SCHEDULE FOR REQUIRED DECK AND ATTACHMENTS.
3. CONTRACTOR SHALL ERECT AND MAINTAIN ADEQUATE TEMPORARY BRACING UNTIL ALL ROOF FRAMING AND DECK ATTACHMENTS ARE COMPLETE.
4. SEE TYPICAL BEAM CONNECTION SCHEDULE FOR TYPICAL W BEAM CONNECTIONS THAT ARE NOT SPECIFICALLY DETAILED.



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

A S-104-3

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

8-23-2021

NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 • 2019
ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436- PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

PROFESSIONAL STRUCTURAL ENGINEER
12/10/20
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
5	5/10/21	PR #4

PROJECT NUMBER 18923

ROOF FRAMING PLAN - PHASE 3

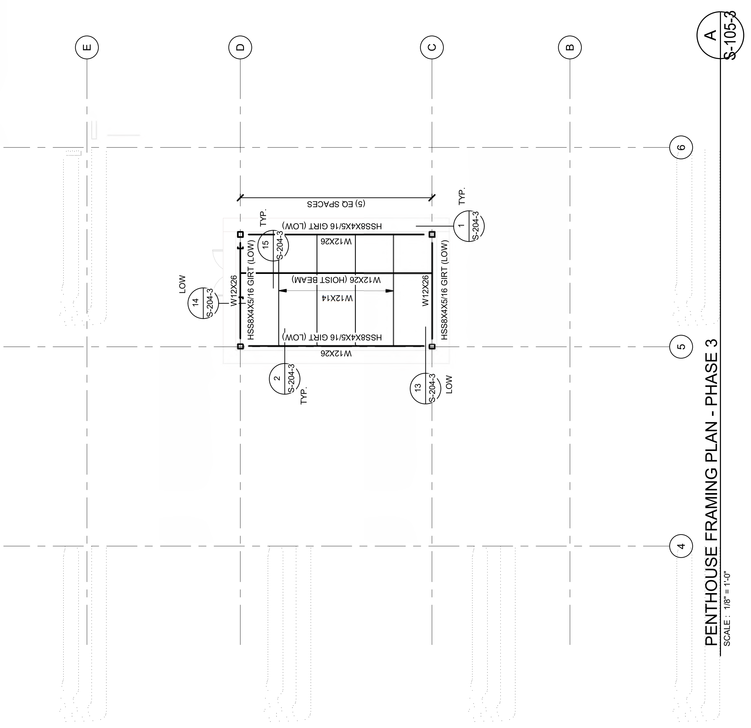
S-104-3

New Stair 3d
SCALE: NONE

B
S-105-3

STAIR ELEVATION
SCALE: 3/16" = 1'-0"

C
S-105-3



PENTHOUSE FRAMING PLAN - PHASE 3
SCALE: 1/8" = 1'-0"

A
S-105-3

PENTHOUSE FRAMING & STAIR ELEVATIONS - PHASE 3

S-105-3

PROJECT NUMBER 16823

	DATE	REVISION
5	5/10/21	PR #4

PROFESSIONAL STRUCTURAL ENGINEER
No. 276196
Robert M. Moyle
STATE OF UTAH
10/1/21

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436- PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

8/23/2021

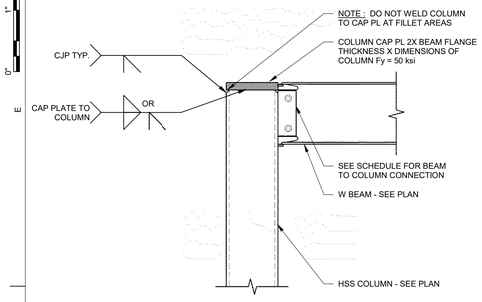
NORTH

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

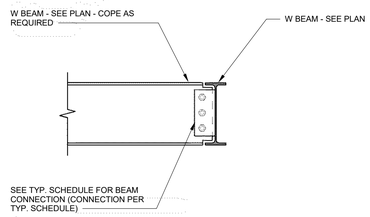
A R W ENGINEERS
50 Years 1969 - 2019
structural consultants
1594 W. Park Cir. Ogden, Utah 84404
ph. 801.782.6008 fx. 801.782.4658

05/19/2022 3:08:44 PM

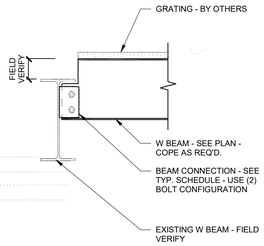
8/10/2021 8:28:53 AM



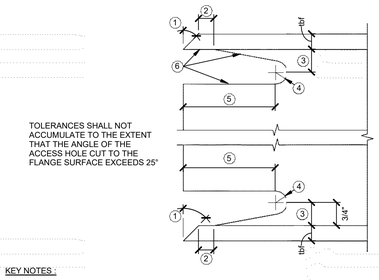
MOMENT FRAME CONNECTION DETAIL — 1 / S-204-3
SCALE : NONE



DETAIL — 2 / S-204-3
SCALE : NONE



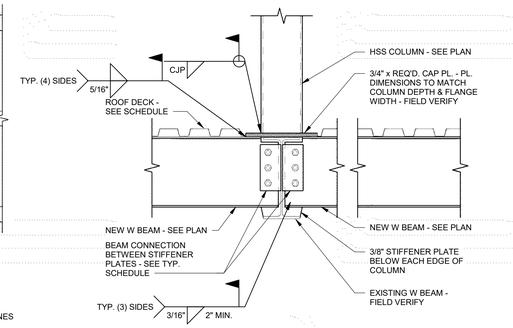
DETAIL — 3 / S-204-3
SCALE : NONE



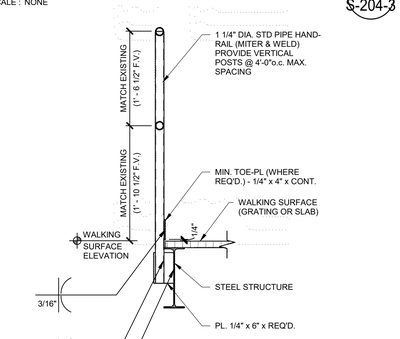
KEY NOTES :

1. BEVEL AS REQUIRED BY AWS D1.1 FOR SELECTED GROOVE WELD PROCEDURE.
2. LARGER OF t_{bf} OR 1/2 INCH. (PLUS 1/2 t_{bf}, OR MINUS 1/4 t_{bf}).
3. 3/4 t_{bf} TO t_{bf}, 3/4" MINIMUM (+/- 1/4 INCH).
4. 3/8" MINIMUM RADIUS (PLUS NOT LIMITED, OR MINUS 0).
5. 3 t_{bf}, (+/- 1/2 INCH).
6. SEE FEMA-353, RECOMMENDED SPECIFICATIONS AND QUALITY ASSURANCE GUIDELINES FOR STEEL MOMENT-FRAME CONSTRUCTION FOR SEISMIC APPLICATIONS, FOR FABRICATION DETAILS INCLUDING CUTTING METHODS AND SMOOTHNESS REQUIREMENTS.

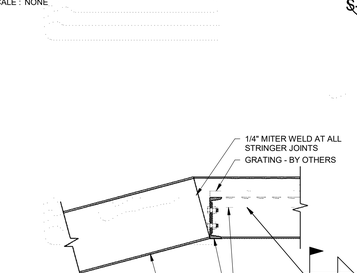
DETAIL — 4 / S-204-3
SCALE : NONE



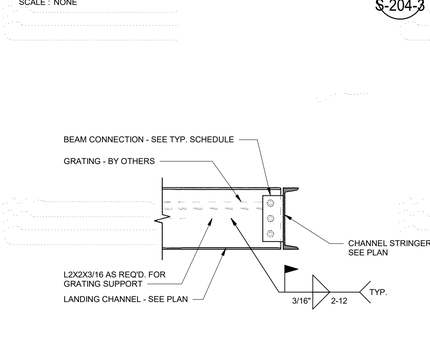
DETAIL — 5 / S-204-3
SCALE : NONE



DETAIL — 6 / S-204-3
SCALE : NONE



DETAIL — 7 / S-204-3
SCALE : NONE



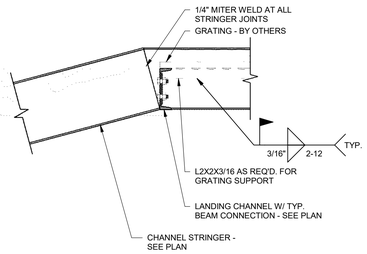
DETAIL — 8 / S-204-3
SCALE : NONE

DETAIL — 9 / S-204-3
SCALE : NONE

DETAIL — 10 / S-204-3
SCALE : NONE

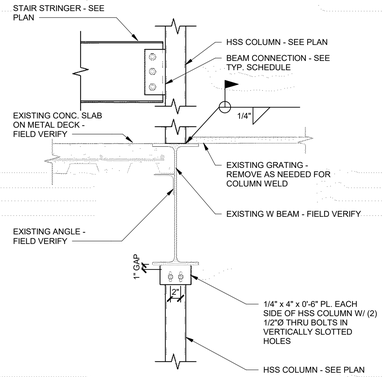
DETAIL — 11 / S-204-3
SCALE : NONE

TYPICAL HANDRAIL CONFIGURATION — 16 / S-204-3
SCALE : NONE

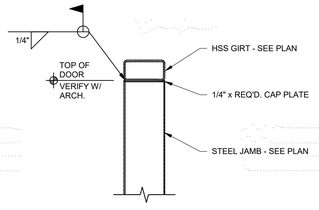


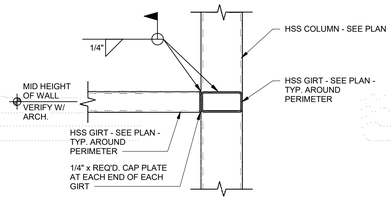
DETAIL — 17 / S-204-3
SCALE : NONE

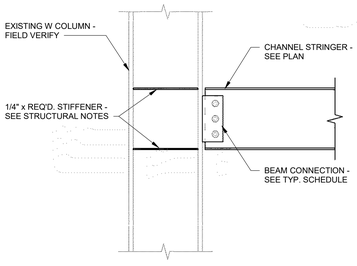
DETAIL — 18 / S-204-3
SCALE : NONE

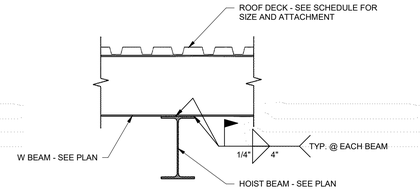


DETAIL — 19 / S-204-3
SCALE : NONE









FFKR ARCHITECTS
730 Pacific Avenue • Salt Lake City, Utah 84104
O 801.521.6186 • FFKR.COM

50 Years 1969 • 2019
ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436- PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

PROFESSIONAL STRUCTURAL ENGINEER
12/10/20
No. 276196
Robert M. Moyle
STATE OF UTAH

	DATE	REVISION
5	5/10/21	PR #4

PROJECT NUMBER 18923

PHASE 3 DETAILS

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

8-23-2021

5
S-204-3

8/10/2021 8:28:56 AM

MECHANICAL LEGEND

(NOTE: NOT ALL SYMBOLS SHOWN ARE USED ON THESE DRAWINGS)

ABBR.	SYMBOL	DESCRIPTION
		- PIPING -
SA		POSITIVE PRESSURE DUCT UP
SA		POSITIVE PRESSURE DUCT DOWN
EA/RA		NEGATIVE PRESSURE DUCT UP
EA/RA		NEGATIVE PRESSURE DUCT DOWN
OA		OUTSIDE AIR INTAKE DUCT UP
OA		OUTSIDE AIR INTAKE DUCT DOWN
		ROUND DUCT UP
		ROUND DUCT DOWN
		CONICAL FITTING WITH DAMPER
		ECCENTRIC FITTING WITH DAMPER
		CONICAL FITTING WITHOUT DAMPER
		ECCENTRIC FITTING WITHOUT DAMPER
		ELBOW WITH TURNING VANES
		ELBOW WITHOUT TURNING VANES
		LONG RADIUS ELBOW
		SHORT RADIUS ELBOW
		DUCTWORK
MVD		MANUAL VOLUME DAMPER
		ACCESS PANEL (SIZE)
		PUMP
		DUCT BREAK

ABBR.	SYMBOL	DESCRIPTION
		- PIPING -
	M	METER
	M	2-WAY MOTOR CONTROL VALVE
	M	3-WAY MOTOR CONTROL VALVE
		BALANCE VALVE
		FLOW MEASURING STATION
		BALL VALVE
		BUTTERFLY VALVE
		CHECK VALVE
		GATE VALVE
		GLOBE VALVE
		PRESSURE REDUCING VALVE
		PRESSURE RELIEF VALVE
		HOSE END DRAIN VALVE
		STRAINER
		STRAINER WITH BLOW OFF VALVE
		PLUG VALVE
		GAS COCK
	S	SOLENOID VALVE
PRV	PR	PRESSURE REGULATING VALVE
		THERMOWELL
		THERMOMETER WITH THERMOWELL
		UNION
	DE	DIELECTRIC COUPLING
		ORIFICE PLATE
		VENTURI
		AUTOMATIC AIR VENT
		MANUAL AIR VENT
		VACUUM BREAKER
		THERMOMETER
		GAUGE
		GAUGE WITH BALL VALVE
		DIFFERENTIAL PRESSURE GAUGE
		PRESSURE TEMPERATURE/TEST POINT

ABBR.	SYMBOL	DESCRIPTION
HTHWS	HTHWS	HIGH TEMP. HOT WATER SUPPLY
HTHWR	HTHWR	HIGH TEMP. HOT WATER RETURN
CWS	CWS	COOLING WATER SUPPLY
CWR	CWR	COOLING WATER RETURN
CHWS	CHWS	CHILLED WATER SUPPLY
CHWR	CHWR	CHILLED WATER RETURN
CDS	CDS	CONDENSER WATER SUPPLY (TOWER)
CDR	CDR	CONDENSER WATER RETURN (TOWER)
CDS	CDS	CONDENSER WATER SUPPLY
CDR	CDR	CONDENSER WATER RETURN
CA	CA	COMPRESSED AIR
IA	IA	INSTRUMENT AIR
PC	PC	PUMPED CONDENSATE
D	D	CONDENSATE OR EQUIPMENT DRAIN
BD	BD	BLOW-DOWN DRAIN
OF	OF	OVERFLOW DRAIN
DCW		DOMESTIC COLD WATER
SW		SOFTENED WATER
NPW		NON-POTABLE WATER
DHW		DOMESTIC HOT WATER
DHWC		DOMESTIC HOT WATER CIRCULATING
DWT	T	DOMESTIC TEMPERED WATER
V	V	DOMESTIC VENT PIPING
W	W	SANITARY WASTE (ABOVE FLOOR)
W	W	SANITARY WASTE (BELOW FLOOR)
OST	OST	STORM OVERFLOW DRAIN
ST	ST	STORM DRAIN (ABOVE FLOOR)
ST	ST	STORM DRAIN (BELOW FLOOR)
SS	SS	SANITARY SEWER (BELOW FLOOR)
G	G	NATURAL GAS
LO	LO	LUBE OIL
		ORIFICE PLATE
		PIPE ANCHOR
		PIPE GUIDE
		FLEX CONNECTION
		PIPE CAP
		PIPE BREAK
		FLOW ARROW
		PIPE DOWN
		PIPE UP
		TEE OUTLET UP
		TEE OUTLET DOWN

ABBR.	SYMBOL	DESCRIPTION
	ZONE # T	THERMOSTAT W/ZONE CALLOUT
	ZONE # HS	HUMIDITY SENSOR W/ZONE CALLOUT
	ZONE # TS	TEMP SENSOR W/ZONE CALLOUT
	CA	CARBON MONOXIDE DETECTOR
	CO_2	CARBON DIOXIDE SENSOR
		DIGITAL INPUT
		ANALOG INPUT
		DIGITAL OUTPUT
		ANALOG OUTPUT
		BI-DIRECTIONAL NETWORK CONNECTION
		FLOW ARROW
	FS	FLOW SWITCH
	TS	DUCT MOUNTED TEMPERATURE SENSOR
	TS	DUCT AVERAGING TEMPERATURE SENSOR
	TS	WELL MOUNTED TEMPERATURE SENSOR
	MD	MOTORIZED DAMPER ACTUATOR
	M	MOTORIZED DAMPER ACTUATOR
	TL	TEMPERATURE LOW LIMIT THERMOSTAT
	SD	DUCT SMOKE DETECTOR
	ES	DAMPER/VALVE END SWITCH
	DPS	DIFFERENTIAL PRESSURE SWITCH
	HPS	HIGH PRESSURE SWITCH
	PS	PRESSURE SWITCH MANUAL RESET
		AQUASTAT
	PE	PRESSURE ELECTRIC SWITCH
	MS	MOTOR STARTER
	CR	CONTROL RELAY
	VFD	VARIABLE FREQUENCY DRIVE
	VFD BP	VARIABLE FREQUENCY DRIVE WITH BY-PASS
	M	ELECTRIC MOTOR
	TC	TEMPERATURE CONTROLLER
	TT	TEMPERATURE TRANSMITTER
	LT	LEVEL TRANSMITTER
	PT	PRESSURE TRANSMITTER
	DPT	DIFFERENTIAL PRESSURE TRANSMITTER
	FT	FLOW TRANSMITTER
	EPT	ELECTRIC/PNEUMATIC TRANSDUCER
	P/I	ELECTRIC/PNEUMATIC TRANSDUCER
		CURRENT SWITCH/TRANSMITTER
	ANN	ANNUNCIATOR
	FACP	FIRE ALARM CONTROL PANEL
	CAM	CONTROL ADDRESSABLE MODULE
	MAM	MONITOR ADDRESSABLE MODULE
	ESR	EMERGENCY STOP RELAY
	LC	LEVEL CONTROLLER
	EPO	EMERGENCY POWER SHUTOFF
	AFS	AIR FLOW SWITCH

ABBR.	SYMBOL	DESCRIPTION
RD		ROOF DRAIN
OD		OVERFLOW DRAIN
FS		FLOOR SINK
FD		FLOOR DRAIN
FCO		FLOOR CLEANOUT
GCO		GRADE CLEANOUT
WCO		WALL CLEANOUT
HB		HOSE BIBB
SA		SHOCK ABSORBERS

- GRAPHIC SYMBOLS -

1	KEY NOTE
#	REVISION NUMBER
TAG	MECHANICAL EQUIPMENT TAG
	SHADING INDICATES MECHANICAL EQUIPMENT
	HATCHING OR HEAVY SHORT DASH INDICATE ITEMS TO BE REMOVED
N	NORTH ARROW
	CONNECT TO EXISTING
EXIST NEW	CONNECT TO EXISTING PIPE
	SPOT ELEVATION

DETAIL BUBBLE
- 1 / M2.1 — DETAIL NUMBER / SHEET NUMBER - WHERE DETAIL IS SHOWN

SECTION CUT
- 1 / XXX — SECTION LETTER / SHEET NUMBER

- ABBREVIATIONS -

AFF	ABOVE FINISHED FLOOR	IE	INVERT ELEVATION
BDD	BACK DRAFT DAMPER	LAT	LEAVING AIR TEMPERATURE
BFF	BELOW FINISHED FLOOR	LWT	LEAVING WATER TEMPERATURE
CL	CENTERLINE	MA	MIXED AIR
CO	CLEANOUT	(N)	NEW
(E)	EXISTING	NC	NORMALLY CLOSED
EA	EXHAUST AIR	NO	NORMALLY OPEN
EAT	ENTERING AIR TEMPERATURE	OA	OUTSIDE AIR
ELEV	ELEVATION	OTCS	OPEN TO CEILING SPACE
ESP	EXTERNAL STATIC PRESSURE	RA	RETURN AIR
EWT	ENTERING WATER TEMPERATURE	SA	SUPPLY AIR
FFE	FINISHED FLOOR ELEVATION	TSP	TOTAL STATIC PRESSURE
FGR	FLUE GAS RECIRCULATION	VTR	VENT THROUGH ROOF

GENERAL NOTES:

CONTRACTOR SHALL REFERENCE SPECIFICATIONS FOR CONSTRUCTION MATERIALS AND INSTALLATION PROCEDURES. SPECIFICATIONS ARE A PART OF THE CONSTRUCTION DOCUMENTS. SHOULD ANY CONFLICT ARISE BETWEEN THE DRAWINGS AND SPECIFICATIONS, SUCH CONFLICT SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR RESOLUTION.

ALL PENETRATIONS THROUGH FIRE-RATED WALLS OR FLOORS ARE TO BE SEALED TO MAINTAIN SEPARATION RATING.

THESE DRAWINGS ARE DIAGRAMMATIC IN CHARACTER AND DO NOT NECESSARILY INDICATE EVERY REQUIRED OFFSET, FITTING, ETC.

ALL DUCTWORK DIMENSIONS SHOWN ARE INTERIOR CLEAR DIMENSIONS. ALLOWANCES FOR DUCT LINER OR INSULATION ARE NOT INCLUDED

EXISTING CONDITIONS ARE TAKEN FROM EXISTING DRAWINGS AND FIELD OBSERVATION. ACTUAL CONDITIONS MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY ALL CONDITIONS PRIOR TO COMMENCING WORK.

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

8-23-2021

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering a greener future
MECHANICAL · ELECTRICAL
INDUSTRIAL + SUSTAINABLE DESIGN
12500 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
RMH Group project number 18977

U OF U BLDG. 303 SEISMIC UPGRADE, PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH
JEFFREY W ELSNER
8-6-21
NO. 9795962202
PROFESSIONAL ENGINEER
Jeff Elsner

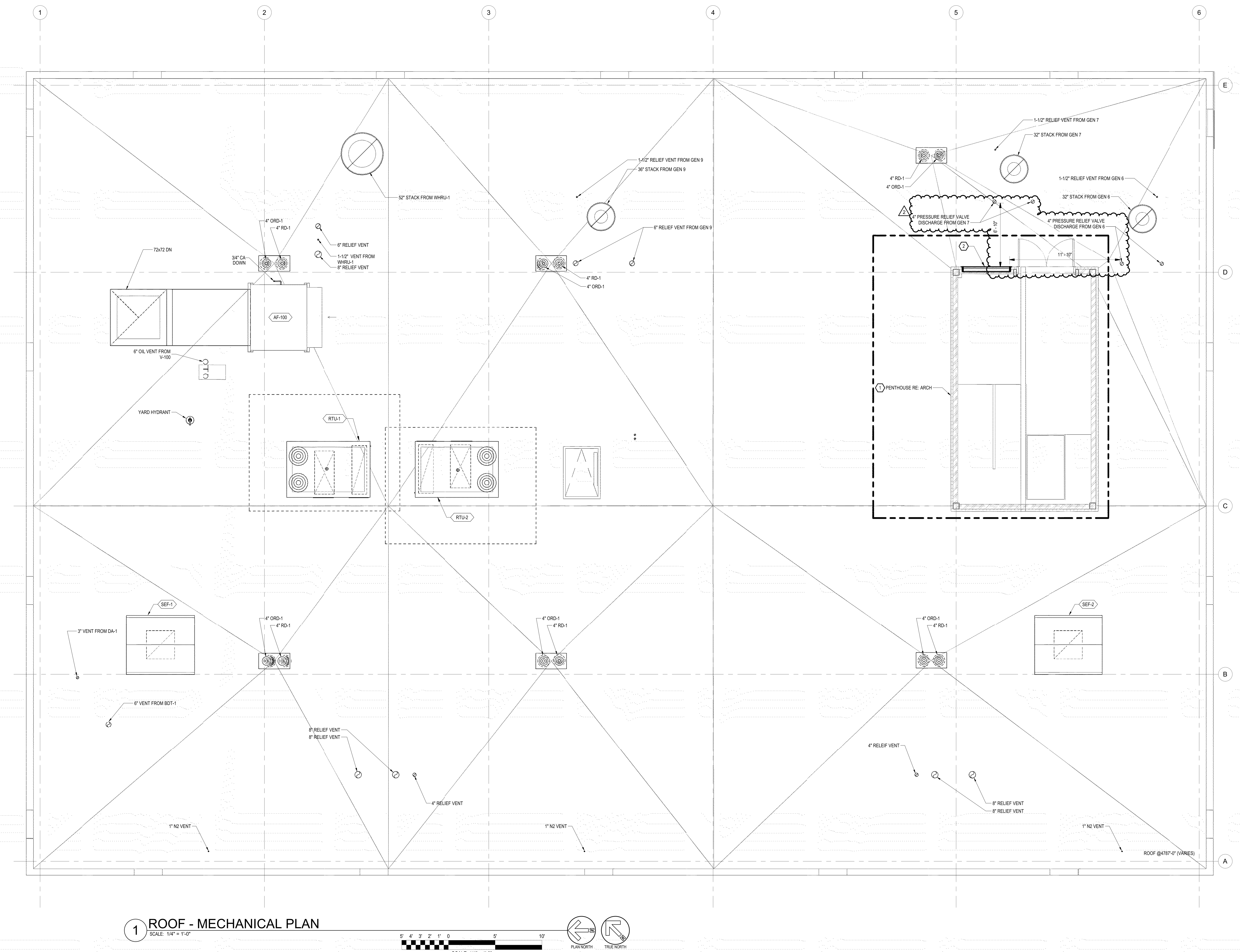
	DATE	REVISION
1	5-03-21	PR-004

PROJECT NUMBER 18136

MECHANICAL LEGEND

M-000-3 1

05/18/2022 3:08:45 PM



1 ROOF - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. EXISTING CONDITIONS ARE TAKEN FROM EXISTING DRAWINGS AND FIELD OBSERVATION. ACTUAL CONDITIONS MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY ALL CONDITIONS PRIOR TO COMMENCING WORK.

KEY NOTES

1. NEW PENTHOUSE WITH STAIR TO ROOF. RE: ARCH
2. PROVIDE NEW 78"H X 62"W STATIONARY DRAINABLE ALUMINUM LOUVER WITH BIRDSCREEN, RUSKIN MODEL 6375DX OR APPROVED EQUAL. LOUVER SHALL HAVE 6" FRAME DEPTH AND MINIMUM FREE AREA OF 50%. FINISH AND COLOR SHALL BE BY ARCHITECT. LOUVER SHALL BE INSTALLED WITH BOTTOM AT MINIMUM 18" ABOVE FINISHED ROOF. PROVIDE LOUVER WITH MOTORIZED CONTROL DAMPER, ELECTRIC ACTUATOR AND OPEN AND CLOSED END SWITCHES. DAMPER CONTROL SHALL BE THROUGH THE JOHNSON CONTROLS INC. DDC SYSTEM. SEE M-601-3 FOR ADDITIONAL INFORMATION.

FFKR ARCHITECTS
730 Pacific Avenue - Salt Lake City, Utah 84104
O 801.521.6186 - FFKR.COM

RMH GROUP
engineering a greener future
MECHANICAL ELECTRICAL INDUSTRIAL + SUSTAINABLE DESIGN

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH — JEFFREY W. ELSNER — 6-2-21 — PROFESSIONAL ENGINEER

	DATE	REVISION
1	5-03-21	PR-004
2	5-11-21	PR-004 BVNA comments

PROJECT NUMBER 18136

ROOF - MECHANICAL PLAN

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on 5/17/2022

~~8-23-2021~~

M-104-3

6/2/2021 8:19:49 AM

05/18/2022 3:08:45 PM

ELECTRICAL LEGEND (NOTE: NOT ALL SYMBOLS SHOWN ARE USED ON THESE DRAWINGS)

– ONE LINE SYMBOLS –

- CIRCUIT BREAKER
- DRAW-OUT CIRCUIT BREAKER (MOLDED INSULATED CASE)
- DRAW-OUT POWER CIRCUIT BREAKER
- CONTROL FUSE
- FUSE WITH SWITCH
- SWITCH
- PANEL XXX – PANELBOARD
- ATS-XX XXX A – AUTOMATIC TRANSFER SWITCH
- 100A4C – FEEDER DESIGNATION, SEE FEEDER SCHEDULE
- AUTOMATIC TRANSFER SWITCH WITH BY-PASS
- ENGINE GENERATOR
- TX-XXXX – TRANSFORMER
- ENCLOSED BUSWAY
- GROUND BUS
- WEATHERHEAD
- MOTOR
- DELTA CONNECTION
- WYE CONNECTION
- GROUNDED WYE CONNECTION
- GROUNDED WYE CONNECTION WITH RESISTOR GROUND
- GROUNDED WYE CONNECTION WITH REACTOR GROUND
- METERING DEVICE
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER
- LOAD-BREAK CONNECTOR
- PROTECTIVE RELAY DEVICE
- KEY INTERLOCK
- 2400V,100A, 10SEC. RESISTOR – RESISTOR
- CONTACT NORMALLY OPEN
- CONTACT NORMALLY CLOSED
- CAPACITOR
- SINGLE BATTERY
- MULTIPLE BATTERIES
- LIGHTNING ARRESTOR
- THERMAL ELEMENT, OVERLOAD RELAY

REV: 08/26/2019

COPYRIGHT, THE RMH GROUP, INC. 2021

– GENERAL –

- BRANCH CIRCUIT HOME RUN TO PANELBOARD, DESIGNATION INDICATES PANEL AND CIRCUIT NUMBERS
- CONTROL WIRING
- LIGHTING, ONE-LINE, AND POWER CIRCUITING
- LIGHTING, ONE-LINE, AND POWER CIRCUITING (UNDERGROUND)
- FLEXIBLE CONDUIT
- CONDUIT BREAK SYMBOL
- CONDUIT CAP
- CONDUIT CHANGE IN ELEVATION
- CONDUIT STUB DOWN (OUT OF DRAWING LIMITS)
- CONDUIT STUB UP (OUT OF DRAWING LIMITS)
- JUNCTION BOX
- WALL MOUNTED JUNCTION BOX
- FLOOR MOUNTED JUNCTION BOX
- PUSH BUTTON
  - A = ABORT
  - DA = DURESS ALARM
  - EPO = EMERGENCY POWER OFF
  - IC = INTERCOM
  - ST = SHUNT TRIP
- SWITCH SYMBOL (#)
  - SINGLE POLE (IF BLANK)
  - 2 = DOUBLE POLE
  - 3 = THREE-WAY
  - 4 = FOUR-WAY
  - AS = ADJUSTABLE SPEED
  - D = DIMMER
  - K = KEY OPERATED
  - LV = LOW VOLTAGE
  - M = MANUAL MOTOR SWITCH
  - OS = OCCUPANCY SENSOR
  - P = WITH PILOT LIGHT
  - T = TIMER
  - TO = THERMAL OVERLOAD
  - VS = VACANCY SENSOR
  - WP = WEATHERPROOF
  - x = SMALL LETTER – LUMINAIRES CONTROLLED
  - XP = EXPLOSION PROOF
- DUAL SWITCH
- INTERCOM SWITCH

– FIRE ALARM DEVICES –

- BELL
- DUCT SMOKE DETECTOR
- FIRE FIGHTER'S TELEPHONE JACK
- COMBINATION FIRE HORN/STROBE LIGHT
- COMBINATION FIRE SPEAKER/STROBE LIGHT
- FIRE ALARM STROBE LIGHT
- FIRE ALARM STROBE, CEILING MOUNT
- FIRE ALARM STROBE/SPEAKER, CEILING MOUNT
- FIRE HORN
- DUAL PROJECTION FIRE HORN
- MANUAL PULL STATION
- MAGNETIC DOOR HOLD OPEN
- DETECTOR / DETECTOR UNDER FLOOR
  - F = FLAME
  - I = IONIZATION TYPE
  - P = PHOTOELECTRIC TYPE
  - T = THERMAL TYPE
- BEAM DETECTOR
- PULL STATION/TELEPHONE JACK
- DELUGE VALVE

– SPECIAL SYSTEMS DEVICES –

- DATA OUTLET
- COMBINATION TELEPHONE/DATA OUTLET
- TELEPHONE OUTLET
- TELEVISION JACK
- CEILING MOUNTED DATA OUTLET
- CEILING MOUNTED TELEPHONE/DATA OUTLET
- CEILING MOUNTED TELEPHONE OUTLET
- FLOOR MOUNTED DATA OUTLET
- FLOOR MOUNTED TELEPHONE/DATA OUTLET
- FLOOR MOUNTED TELEPHONE OUTLET
- TTB – TELEPHONE TERMINAL BOARD
- DTB – DATA TERMINAL BOARD
- MICROPHONE OUTLET
- SPEAKER
  - V = WITH INTEGRAL VOLUME CONTROL
- WALL MOUNTED SPEAKER
- WALL MOUNTED VOLUME CONTROL
- CLOCK RECEPTACLE OUTLET
- SECURITY CAMERA
- THERMOSTAT
- SPECIAL SYSTEMS SYMBOLS:
  - AB = ABORT BUTTON
  - AMP = AMPLIFIER
  - ANN = ANNUNCIATOR
  - ASD = ADJUSTABLE SPEED DRIVE
  - ATS = AUTOMATIC TRANSFER SWITCH
  - B = BUZZER
  - BMS = BALANCED MAGNETIC STRIP
  - CAM = CONTROL ADDRESSABLE MODULE
  - CH = CHIME
  - CK = CARD READER/KEYPAD
  - CR = CARD READER
  - DA = DURESS ALARM PUSH-BUTTON
  - DC = DOOR CONTACT
  - DE = DELAYED EGRESS
  - DMA = DOOR MANAGEMENT ALARM
  - DO = DOOR OPERATOR
  - DS = DOOR STRIKE
  - DTC = DATA TERMINAL CABINET
  - DVR = DIGITAL VIDEO RECORDER
  - EC = ELECTRICAL CONTACTOR
  - EL = ELECTRIC LOCK
  - ES = ELECTRIC STRIKE
  - F = MANUAL PULL STATION
  - FAA = FIRE ALARM ANNUNCIATOR
  - FACP = FIRE ALARM CONTROL PANEL
  - FS = FLOW SWITCH
  - FSD = FIRE SMOKE DAMPER
  - GB = GLASSBREAK DETECTOR
  - HC = HANDICAP PUSH-BUTTON
  - IC = INTERCOM CALL STATION
  - IP = INDICATOR PANEL
  - KP = KEYPAD
  - MAM = MONITOR ADDRESSABLE MODULE
  - MH = MANHOLE
  - MD = MOTORIZED DAMPER
  - MS = MOTION SENSOR
  - ML = MAGNETIC LOCK
  - NCMS = NURSE CALL MASTER STATION CM-CENTRALIZED PHYSIOLOGICAL MONITORING STATION
  - NCT = NURSE CALL TERMINAL CABINET
  - OS = OCCUPANCY SENSOR
  - PA = PUBLIC ADDRESS
  - PB = PULLBOX
  - PIR = PASSIVE INFRARED DETECTOR
  - PM = POWER QUALITY METER
  - PS = PRESSURE SWITCH
  - R = REMOTE INDICATING LIGHT
  - RT = REMOTE TEST STATION
  - RX = REQUEST TO EXIT PUSH-BUTTON
  - S = WALL MOUNTED SPEAKER
  - SAP = SECURITY ALARM PANEL
  - SPD = SURGE PROTECTIVE DEVICE
  - TC = TIME CLOCK
  - TS = TAMPER SWITCH
  - VFD = VARIABLE FREQUENCY DRIVE
  - VM = VIDEO MONITOR
  - VS = VACANCY SENSOR

– POWER –

- DUPLEX RECEPTACLE
  - D = DEDICATED CIRCUIT
  - IG = ISOLATED GROUND DEVICE
- GFI = GROUND FAULT CIRCUIT INTERRUPTER
- FLOOR MOUNTED DUPLEX RECEPTACLE
- FLOOR MOUNTED FOURPLEX RECEPTACLE
- FLOOR MOUNTED SPECIAL PURPOSE RECEPTACLE
- CEILING MOUNTED DUPLEX RECEPTACLE
- CEILING MOUNTED FOURPLEX RECEPTACLE
- CEILING MOUNTED SPECIAL PURPOSE RECEPTACLE
- FOURPLEX RECEPTACLE
- RANGE RECEPTACLE
- SINGLE RECEPTACLE
- SPECIAL PURPOSE RECEPTACLE
- SWITCHED RECEPTACLE
- DUPLEX EMERGENCY/CRITICAL
- FOURPLEX EMERGENCY/CRITICAL
- DUPLEX-2PORT USB
- 4PORT USB
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- ENCLOSED CIRCUIT BREAKER
- MOTOR STARTER
- COMBINATION MOTOR STARTER
- COMBINATION SWITCH AND RECEPTACLE
- CONDUIT SEAL OFF
- FIRE RATED POKE-THROUGH
- PARTITION CIRCUIT SPLIT
- POWER POLE
- SURFACE RACEWAY
- METER

– NURSE CALL –

- CODE BLUE STATION
- CODE PINK STATION
- EMERGENCY CALL PULL STATION
- SINGLE PATIENT STATION
- STAFF ASSIST STATION
- AUXILIARY INPUT STATION
- DUTY STATION
- STAFF STATION
- BED INTERFACE STATION
- TWO BUTTON STATION
- BED MANAGEMENT STATION
- DOME LIGHT
- ZONE LIGHT INTERSECTION
- REMOTE LOCATOR
- PATIENT MONITOR

– LIGHTING – (REFER TO LUMINAIRE SCHEDULE)

- LUMINAIRES
  - X = FIXTURE DESIGNATION
  - # = BRANCH CIRCUIT NUMBER
  - * = SWITCH LEG IDENTIFIER
- SHADING INDICATES LUMINAIRE ON LIFE SAFETY
- SHADING INDICATES PORTION OF LUMINAIRE ON LIFE SAFETY
- WALL MOUNTED LUMINAIRE
- STRIP LIGHT
- STRIP LIGHT WITH LIFE SAFETY
- POLE MOUNTED LUMINAIRE (QUANTITY OF LUMINAIRES PER POLE AS INDICATED ON PLANS)
- DOWNLIGHT LUMINAIRE
- WALL WASHER LUMINAIRE
- ADJUSTABLE LUMINAIRE
- PENDANT LUMINAIRE
- TRACK LIGHTING
- PHOTOCELL
- EXIT LIGHT (WITH FACES AND DIRECTION ARROWS INDICATED)
- WALL MOUNTED EXIT LIGHT (WITH FACES AND DIRECTION ARROWS INDICATED)
- WALL MOUNTED BATTERY PACK EMERGENCY LIGHT

– GROUNDING SYMBOLS –

- GROUND TEST WELL
- GROUNDING CONDUCTOR
- LIGHTNING PROTECTION AIR TERMINAL
- BONDING POINT
- GROUND BAR
- ELECTRICAL GROUND
- GROUND ROD
- GROUND ROD WITH INSPECTION TEST WELL
- PIGTAIL

– EQUIPMENT –

- DISTRIBUTION PANEL
- EXISTING DISTRIBUTION PANEL
- NEW PANEL, FLUSH MOUNTED
- EXISTING PANEL, FLUSH MOUNTED
- NEW PANEL, SURFACE MOUNTED
- EXISTING PANEL, SURFACE
- TRANSFORMER

– ABBREVIATIONS –

(E)	EXISTING
(N)	NEW
(PART)	PARTIAL CIRCUIT
A	AMP
AC	ABOVE COUNTER TOP
AF	AMP FRAME, AMP FUSE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AIC	AMPS INTERRUPTING CAPACITY
AL	ALUMINUM
APL	APPLIANCE
AS	AMP SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIOVISUAL
BJ	BONDING JUMPER
C	CONDUIT
CB	CIRCUIT BREAKER
CCT	CIRCUIT
CCTV	CLOSED CIRCUIT T.V.
CLG	CEILING
CU	COPPER
DISC	DISCONNECT
DIST	DISTRIBUTION
E/G	ENGINE/GENERATOR
ELEC	ELECTRIC, ELECTRICAL
ELEV	ELEVATOR ELEVATION
EM	EMERGENCY
EQPT	EQUIPMENT
F	FUSE
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FIXT	FIXTURE
FO	FIBER OPTIC
FLR	FLOOR
FLUOR	FLUORESCENT
G	GROUND (EQUIPMENT)
GEN	GENERATOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GF	GROUND FAULT PROTECTION
GND	GROUND
HC	HANDICAPPED
HG	HOSPITAL GRADE
HP	HORSEPOWER
HV	HIGH VOLTAGE
INC	INCANDESCENT
IDF	INTERMEDIATE DISTRIBUTION FRAME
IG	ISOLATED GROUND
JB	JUNCTION BOX
LED	LIGHT EMITTING DIODE
LTG	LIGHTING
LV	LOW VOLTAGE
MATV	MASTER ANTENNA T.V.
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDF	MAIN DISTRIBUTION FRAME
MH	MANHOLE
MLO	MAIN LUGS ONLY
MOP	METHOD OF PROCEDURE
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
MV	MEDIUM VOLTAGE
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NF	NON-FUSED
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
OHE	OVERHEAD ELECTRIC
P	POLE
PA	PUBLIC ADDRESS
PB	PULL BOX
PH	PHASE
PNL	PANEL
PWR	POWER
RCPT(S)	RECEPTACLE(S)
SBC	STRANDED BARE COPPER
SPD	SURGE PROTECTIVE DEVICE
SW	SWITCH
TEL	TELEPHONE
TP	TAMPERPROOF
TV	TELEVISION
UF	UNDERFLOOR
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTAGE
VFD	VARIABLE FREQUENCY DRIVE
VP	VAPOR PROOF
W	WIRE
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

APPLICABLE CODES

AHJ: University of Utah

FIRE AUTHORITY: University of Utah

REMODEL ☒ NEW ☐

YEAR	CODE
2018	INTERNATIONAL BUILDING CODE
2018	INTERNATIONAL MECHANICAL CODE
2018	INTERNATIONAL PLUMBING CODE
2018	INTERNATIONAL ENERGY CONSERVATION CODE
2018	INTERNATIONAL FIRE CODE
2017	NATIONAL ELECTRICAL CODE
2018	INTERNATIONAL EXISTING BUILDING CODE
2018	INTERNATIONAL RESIDENTIAL CODE
2018	INTERNATIONAL ENERGY CONSERVATION CODE

IS THE BUILDING FULLY SPRINKLERED? ☐ YES ☒ NO

IS THE BUILDING FULLY DETECTED? ☐ YES ☒ NO

– GRAPHIC SYMBOLS –

- KEY NOTE
- REVISION NUMBER
- DETAIL NOTE
- X = DENOTES ALL LUMINAIRES IN THE RESPECTIVE AREA ARE THE TYPE INDICATED, REFER TO LUMINAIRE SCHEDULE
- PANEL FLAG
- OWNER EQUIPMENT TAG
- LIGHTING CONTROL SEQUENCE INDICATION, SEE LIGHTING CONTROL SEQUENCE OF OPERATION SCHEDULE FOR INFORMATION X = DENOTES ILLUMINATION SET POINT
- MECHANICAL EQUIPMENT TAG
- SHADING INDICATES EQUIPMENT
- HATCHING INDICATES ITEM(S) TO BE REMOVED
- A100 – ROOM NUMBER
- NORTH ARROW
- DETAIL BUBBLE
  - DETAIL NUMBER
  - SHEET NUMBER – WHERE DETAIL IS SHOWN
- SECTION CUT
  - SECTION NUMBER/LETTER
  - SHEET NUMBER – WHERE SECTION IS SHOWN

GENERAL NOTES

SPECIFICATIONS ARE A PART OF THE CONSTRUCTION DOCUMENTS. SHOULD ANY CONFLICT ARISE BETWEEN THE DRAWINGS AND SPECIFICATIONS, BRING SUCH CONFLICT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION. UNLESS OTHERWISE DIRECTED BY ENGINEER, THE MOST STRINGENT REQUIREMENT WILL PREVAIL.

DATA ON THE DRAWINGS IS AS EXACT AS COULD BE REASONABLY SECURED. ABSOLUTE ACCURACY IS NOT GUARANTEED. VERIFY EXACT LOCATIONS, MEASUREMENTS, LEVELS, SPACE REQUIREMENTS, POTENTIAL CONFLICTS WITH OTHER TRADES. ADAPT WORK TO ACTUAL CONDITIONS AT THE SITE. BEFORE SUBMITTING COSTS VISIT THE SITE TO BECOME THOROUGHLY FAMILIAR WITH THE ACTUAL CONDITIONS OF THIS PROJECT. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE; DO NOT SCALE. THESE DRAWINGS DO NOT SHOW MATERIALS FOR A COMPLETE INSTALLATION; PLAN THE INSTALLATION AND LAYOUT OF THE WORK AS DIAGRAMMED IN THESE DOCUMENTS. REFER TO FLOOR PLANS, SCHEMATICS AND DIAGRAMS OF OTHER TRADES FOR ELECTRICAL REQUIREMENTS, BRANCH CIRCUITS AND OTHER ELECTRICAL CONNECTIONS NOT INDICATED ON THESE DOCUMENTS.

FIRE-SEAL ALL PENETRATIONS THROUGH RATED WALLS AND FLOORS WITH MATERIALS CAPABLE OF PREVENTING THE PASSAGE OF FLAMES AND HOT GASES WHEN SUBJECTED TO THE REQUIREMENTS OF THE TEST STANDARD SPECIFIC FOR FIRE STOPS ASTM E814.

JUNCTION BOXES FOR LUMINAIRES AND OUTLETS ARE NOT INDICATED. PROVIDE THE PROPER NUMBER OF JUNCTION BOXES TO MEET LOCAL CODE AND NATIONAL ELECTRICAL CODE.

EXECUTE THE WORK IN ACCORDANCE WITH SUPPORTING OBJECTS FOR SEISMIC ZONE REQUIRED BY STATE AND LOCAL CODES ALL CEILING ATTACHED OBJECTS AND FLOOR ATTACHED EQUIPMENT INCLUDING, BUT NOT LIMITED TO: PENDANT LIGHTING FIXTURES, GENERAL LIGHTING, MULTIPLE RACEWAYS, GENERATOR, TRANSFORMER, ELECTRICAL SWITCHGEAR, SWITCHBOARDS AND OTHER ELECTRICAL EQUIPMENT.

WHERE DISCONNECTS ARE INDICATED ON DRAWINGS PROVIDE FINAL CONNECTION TO EQUIPMENT BEING SERVED BY DISCONNECT. DISCONNECTING MEANS FOR ALL MECHANICAL EQUIPMENT SHALL BE ACCESSIBLE AND HAVE THE CLEARANCE REQUIRED BY NEC.

FOR HAZARDOUS (CLASSIFIED) AREAS COMPLY WITH NFPA 70 (NEC). PROVIDE ALL REQUIRED SEAL-OFF FITTINGS WHERE CONDUITS ENTER OR LEAVE AREAS HAVING HAZARDOUS ATMOSPHERES AND AREAS OF WIDELY DIFFERENT TEMPERATURES OR HUMIDITY. PROVIDE ENCLOSURES, CONDUIT FITTINGS AND METAL CONDUIT FOR HAZARDOUS (CLASSIFIED) LOCATIONS IN COMPLIANCE WITH UL 913, ANSI/UL 121201, ANSI/UL 122701, ANSI/NFPA 496, AND UL 1203.

UP-TO-DATE ELECTRICAL RECORD DRAWINGS ARE NOT AVAILABLE FOR THIS PROJECT. INFORMATION FOR EXISTING CIRCUITRY IS BASED ON EXISTING PANEL DIRECTORIES, AVAILABLE DRAWINGS, AND ASSUMPTIONS. LOCATIONS AND INFORMATION FOR EXISTING ELECTRICAL DEVICES AND EQUIPMENT SHOWN ON THESE DOCUMENTS ARE APPROXIMATE AND WERE DERIVED FROM FIELD OBSERVATION AND AVAILABLE RECORD DRAWINGS. VERIFY ACTUAL FIELD CONDITIONS PRIOR TO STARTING WORK.

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering a greener future
MECHANICAL, ELECTRICAL, INDUSTRIAL + SUSTAINABLE DESIGN
12600 West Colfax Avenue
Lakewood Colorado 80215
Phone 303.239.0909
Fax 303.235.0218
www.rmhgroup.com
RMH Group project number

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ.#22210 - C.D. PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

DANIEL V. SANDBLOM — STATE OF UTAH (professional engineer stamp) 06/08/2021

△	DATE	REVISION
1	5-03-21	PR-004
2	5-11-21	PR-004 BVNA COMMENTS

PROJECT NUMBER

ELECTRICAL LEGEND

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

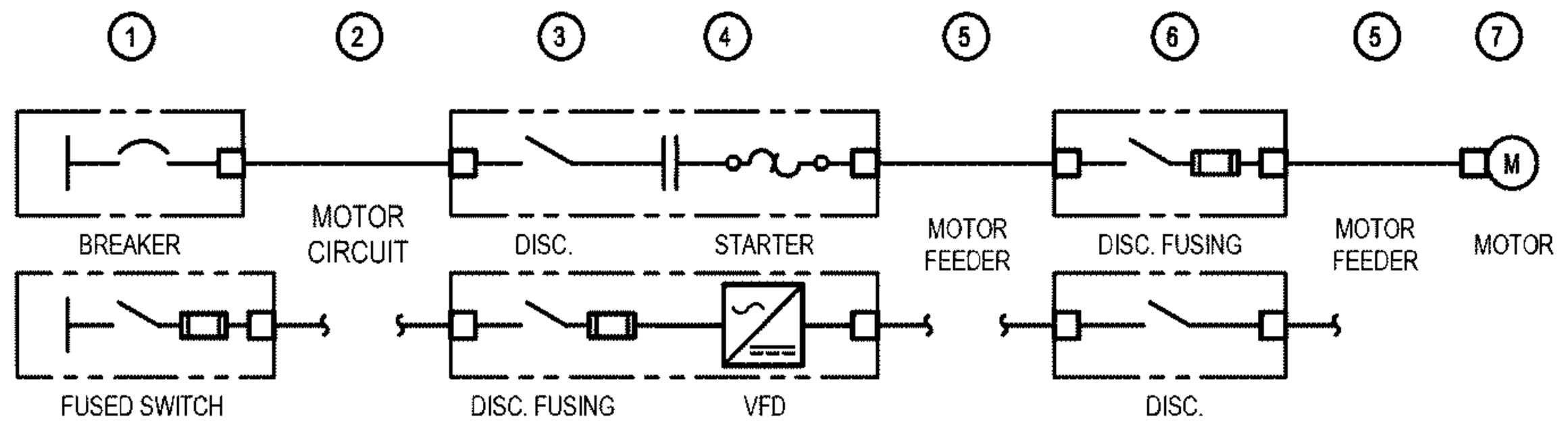
~~8-23-2021~~

E-000-3 △

5/7/2019 11:13:15 AM

05/18/2022 3:08:45 PM

20A, 2P = 2-POLE MOTOR RATED SWITCH
2S1W = TWO SPEED, ONE WINDING
2S2W = TWO SPEED, TWO WINDING
FVNR = FULL VOLTAGE NON-REVERSING
FVR = FULL VOLTAGE REVERSING
SM, 2P = 2-POLE MANUAL STARTER SWITCH
SSRVS = SOLID STATE REDUCED VOLTAGE
STO, 2P = MANUAL STARTER SWITCH WITH THERMAL OVERLOADS
VFD = VARIABLE SPEED DRIVE



EQUIPMENT SCHEDULE

Version 0820

LEGEND KEY ⇨		⑦						①			②	②	⑥	
KEY	ITEM DESCRIPTION (SEE NOTE 1)	VOLTS	PH	MOTOR HP	UNIT FLA	UNIT KVA	UNIT KW	PANEL (SEE NOTE 2)	BREAKER SIZE	FUSING (SEE NOTE 4)	MOTOR CIRCUIT KEY	MOTOR CIRCUIT	LOCAL DISC. SW. (SEE NOTE 3)	REMARKS
PH-LR1	PENTHOUSE LOUVER	115	1	- -	3.0	0.3	0.3	FFP1A	15.0	5.0	15A2GM	3/4" C - 2#12, 1#12G	30A, 2P, FUSED	SEE NOTE(S) 1, 3, 4
	TOTALS	115	1	0	3	0	0							

Version 0820 △2

NOTES:

1. COORDINATE ELECTRICAL EQUIPMENT REQUIREMENTS WITH THE ACTUAL MECHANICAL EQUIPMENT SUPPLIED. VERIFY THE COMPONENT OR EQUIPMENT MARKED NAMEPLATE SCCR IS EQUAL TO OR GREATER THAN THE AVAILABLE FAULT CURRENT INDICATED. IF THE NAMEPLATE SCCR IS LESS THAN THE AVAILABLE FAULT CURRENT, PROTECT COMPONENT OR EQUIPMENT TO AVAILABLE SHORT-CIRCUIT CURRENT INDICATED ACCORDING TO ANSI/UL 508A, SUPPLEMENT SB, USING NRTL LISTED COMPONENTS. SUBMIT [illegible]
2. REFER TO PANEL SCHEDULES FOR EXACT CIRCUIT NUMBER.
3. IF A FUSE SIZE IS INDICATED, PROVIDE A FUSED DISCONNECT UNLESS INDICATED OTHERWISE.
4. FUSE SIZE INDICATED MUST BE USED IN COMBINATION WITH PROPERLY SIZED OVERLOAD RELAYS. UNLESS INDICATED OTHERWISE, FUSES SHALL BE BUSSMANN LPS-RK OR LPN-RK. CONFIRM ACTUAL NAMEPLATE DATA OF EQUIPMENT AND PROVIDE FUSES RECOMMENDED BY MANUFACTURER.

1 (E-001) EQUIPMENT SCHEDULE
SCALE: NONE

PANEL: **FFP1A** VOLTAGE: 120/208 V. 3 PH 4 W. 60 HZ TYPE: PANELBOARD

MOUNTING: SURFACE

FED FROM: TF-FFP1A PANEL COVER: SURFACE

150 AMP MAIN RATED AT 80% NEUTRAL BUS: YES

~~N/A AMP MAIN LUGS~~ ~~GROUND BUS: YES ISOLATED GND: NO~~

225 AMP BUS

ALUMINUM BUSING

10000 SYMMETRICAL RMS AMPS PANEL SHORT CIRCUIT RATING

NOTE: 1. PANEL INSTALLED IN DIFFERENT PHASE
2. NEW LOAD ON EXISTING PANEL
3. [ ]
4. [ ]

NOTE	DESCRIPTION	CCT VA	BREAKER AMP / P	CCT PH CCT	BREAKER AMP / P	CCT VA	DESCRIPTION	NOTE
	SURGE PROTECTION DEVICE	0	60 / --	1 A 2	20 / 1	0	SPARE	
	" "	0	-- / --	3 B 4	20 / 1	0	SPARE	
	" "	0	-- / 3	5 C 6	20 / 1	0	SPARE	
	P-7A STEAM FEED	820	15 / 1	7 A 8	15 / 1	0	SPARE	
	P-7B STEAM FEED	820	15 / 1	9 B 10	15 / 1	0	SPARE	
	DA-1	1200	15 / 1	11 C 12	15 / 1	0	SPARE	
	HEX-1	1000	20 / 1	13 A 14	**15 / 1**	**500**	**PENTHOUSE LOUVER CTRLS**	**2**
	P-8C DEAERATOR CIRCULATION	1120	20 / 1	15 B 16	**15 / 1**	**360**	**RECEPTACLES PENTHOUSE**	**2**
	P-8D DEAERATOR CIRCULATION	1120	20 / 1	17 C 18	**15 / 1**	**200**	**OUTSIDE LIGHTING PENTHOUSE**	**2**
	SPARE	0	20 / --	19 A 20	20 / --	0	SPARE	
	SPARE	0	-- / --	21 B 22	-- / --	0	SPARE	
	SPARE	0	-- / 3	23 C 24	-- / 3	0	SPARE	
	SPACE	0	/ 1	25 A 26	0	0	SPACE	
	SPACE	0	/ 1	27 B 28	/ 1	0	SPACE	
	SPACE	0	/ 1	29 C 30	/ 1	0	SPACE	
	SPACE	0	/ 1	31 A 32	/ 1	0	SPACE	
	SPACE	0	/ 1	33 B 34	-- / 3	0	SPACE	
	SPACE	0	/ 1	35 C 36	/ 1	0	SPACE	
	SPACE	0	/ 1	37 A 38	/ 1	0	SPACE	
	SPACE	0	/ 1	39 B 40	-- / 3	[illegible]	SPACE	
	SPACE	0	/ 1	41 C 42	/ 1	0	SPACE	

△2

PANEL LOADING SUMMARY					
LOAD TYPE	PH A	PH B	PH C	TOTAL	
INCANDESCENT	0.0	0.0	0.0	0.0	kVA
INDUCTIVE LTG	0.0	0.0	0.2	0.2	kVA
RECEPTACLES	0.0	0.4	0.0	0.4	kVA
MOTORS	0.8	1.9	1.1	3.9	kVA
APPLIANCES	0.0	0.0	0.0	0.0	kVA
HEAT	1.0	0.0	1.2	2.2	kVA
COMPUTER	0.0	0.0	0.0	0.0	kVA
OTHER	0.5	0.0	0.0	0.5	kVA
NONCOINCIDEN	0.0	0.0	0.0	0.0	kVA
PEAK LOAD	0.0	0.0	0.0	0.0	kVA
TOTAL	2.3	2.3	2.5	7.0	kVA

PHASE BALANCE	A-B	B-C	C-A	PF
(%)	100	92	92	86

MIN PANEL AMPACITY	23	AMPERES

NEC DEMAND LOAD SUMMARY										
LOAD TYPE	kW		POWER FACT		kVA		DEMAND FACTOR		CALCULATED LOAD	
INCANDESCENT	0.0	@	100%	=	0.0	@	125%	=	0.0	kVA
INDUCTIVE LTG	0.2	@	95%	=	0.2	@	125%	=	0.3	kVA
RECEPTACLES										
FIRST 10 kVA	0.4	@	95%	=	0.4	@	100%	=	0.4	kVA
REMAINDER	0.0	@	95%	=	0.0	@	50%	=	-	kVA
MOTORS										
LARGEST	0.9	@	80%	=	1.1	@	125%	=	1.4	kVA
REMAINDER	2.2	@	80%	=	2.8	@	100%	=	2.8	kVA
APPLIANCES	0.0	@	80%	=	0.0	@	100%	=	0.0	kVA
HEAT	2.2	@	100%	=	2.2	@	125%	=	2.8	kVA
COMPUTER	0.0	@	95%	=	0.0	@	100%	=	0.0	kVA
OTHER	0.4	@	85%	=	0.5	@	100%	=	0.5	kVA
NONCOINCIDEN	0.0	@	95%	=	0.0	@	0%	=	-	kVA
PEAK LOAD	0.0	@	90%	=	0.0	@	125%	=	0.0	kVA
0 % SPARE	0.0	@	90%	=	0.0	@	100%	=	0.0	kVA
TOTAL	6.0	kW			7.0	kVA			8.2	kVA

Version 0816a

2 (E-001) ELECTRICAL SCHEDULES
SCALE: NONE

LUMINAIRE SCHEDULE

Version 1107

KEY	LAMP(S) QTY	LAMP(S) TYPE	DESCRIPTION	FINISH	MOUNTING	SPECIFICATION (NOTE 1) MANUFACTURER	CATALOG NUMBER	VOLTS	WATTS	NOTES
A	NA	LED	SURFACE MOUNT LINEAR LED	WHITE	SURFACE	ALS	IL4A-SWSC-WH-UD	100-277	44	SELECTABLE 44W AND 4000K CCT
B	NA	LED	HORIZONTAL WALL MOUNT ENTRY LIGHT WITH PHOTOCELL CONTROL	GRAY	SURFACE	FAIL-SAFE	B95-HE-GRY-LD4-20W-40-OPL-UNV-EDC1-PB120-NTP-SCB-GRY	100-277	20	NON-TAMPER PROOF HARDWARE

LUMINAIRE SCHEDULE NOTES:

1. COORDINATE THE VOLTAGE AND MOUNTING CONFIGURATION WITH THE PLANS.

3 (E-001) LUMINAIRE SCHEDULES
SCALE: NONE

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

~~8-23-2021~~

5/7/2019 11:13:15 AM

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering a greener future
MECHANICAL, ELECTRICAL, INDUSTRIAL + SUSTAINABLE DESIGN
12600 West Colfax Avenue
Lakewood Colorado 80215
Phone 303.239.0909
Fax 303.235.0218
www.rmhgroup.com
RMH Group project number 19977

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ.#22210 - C.D. PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

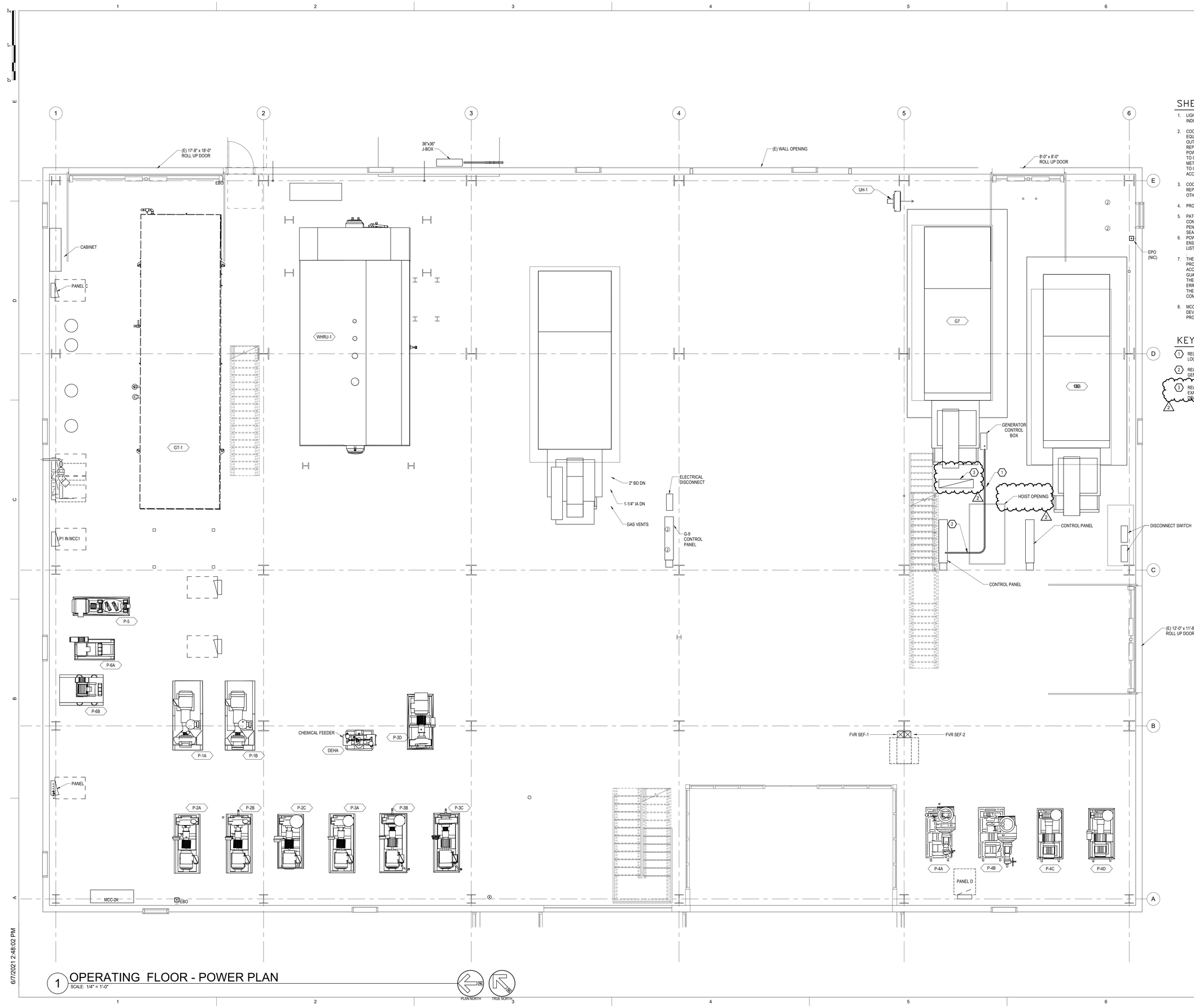
LICENSED PROFESSIONAL ENGINEER
No. 9798512-2202
DANIEL V SANDBLOM
06/08/2021
STATE OF UTAH

△	DATE	REVISION
1	5-03-21	PR-004
2	5-11-21	PR-004 BVNA COMMENTS

PROJECT NUMBER

ELECTRICAL SCHEDULES

E-001-3 △1



SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. COORDINATE TIMING OF REMOVALS WITH OTHER TRADES. EXISTING EQUIPMENT MUST REMAIN FUNCTIONAL UNTIL THE TIME OF SCHEDULED OUTAGE. NOTIFICATION SHALL BE PROVIDED TO THE UNIVERSITY REPRESENTATIVE A MINIMUM OF TWO WEEKS PRIOR TO SHUT DOWN OF POWER TO EXISTING EQUIPMENT. ACCOMPLISH ALL PREP WORK PRIOR TO OUTAGE TO MINIMIZE THE OUTAGE TIME FRAME. SUBMIT A DETAILED METHOD OF PROCEDURE (MOP) FOR ALL OUTAGES FOUR WEEKS PRIOR TO OUTAGE. PERFORM OUTAGES DURING OFF HOURS AT A TIME ACCEPTABLE BY THE OWNER.
3. COORDINATE CONTROLS CONDUIT RELOCATION ROUTES WITH OWNERS REPRESENTATIVE TO MAINTAIN PROPER CLEARANCES AND ACCESS TO OTHER EQUIPMENT.
4. PROVIDE TEMPORARY POWER FOR ALL CONSTRUCTION NEEDS.
5. PATCH AND PAINT ANY DAMAGED SURFACES DUE TO DEMOLITION AND CONSTRUCTION TO MATCH EXISTING CONDITIONS. SEAL ALL PENETRATIONS THROUGH RATED CEILINGS AND WALLS WITH UL LISTED SEALANTS AND FIRESTOPPING MATERIALS.
6. POWER DISTRIBUTION LUG SIZES ARE NOT INDICATED ON THIS DRAWING. ENSURE THAT ALL LUGS ARE SIZED TO ACCOMMODATE THE FEEDERS LISTED IN THE FEEDER SCHEDULE
7. THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. DATA PRESENTED ON THIS DRAWING IS AS ACCURATE AS CAN BE DETERMINED, BUT ACCURACY IS NOT GUARANTEED. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NEITHER RESPONSIBLE FOR ITS ACCURACY, NOR ERRORS NOR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DOCUMENTS. FIELD VERIFICATION OF ALL AFFECTED COMPONENTS IS REQUIRED.
8. MCC OUTPUTS SHOWN DO NOT SHOW LOAD DETAILS OR DOWNSTREAM DEVICE DETAILS. LOAD INFORMATION, BREAKER SIZES, MOTOR PROTECTION AND FEEDER SIZES HAVE NOT BEEN PROVIDED.

KEY NOTES

1. RELOCATE CONDUIT TO BE OUTSIDE OF THIS AREA. COORDINATE EXACT LOCATION OF AREA WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS.
2. RELOCATE THREE CONTROLS CONDUITS CONNECTED TO THE GENERATOR CONTROL CABINET.
3. RELOCATE EXISTING LIGHTING FIXTURE TO COLUMN LINE C. COORDINATE EXACT LOCATION OF AREA WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS.

1 OPERATING FLOOR - POWER PLAN
SCALE: 1/4" = 1'-0"

PLAN NORTH / TRUE NORTH

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022
~~8-23-2021~~

6/7/2021 2:48:02 PM

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering + green future
MECHANICAL · ELECTRICAL
INDUSTRIAL + SUSTAINABLE DESIGN
12500 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
RMH Group project number

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

LICENSED PROFESSIONAL ENGINEER
No. 9798512-2202
DANIEL V SANDBLOM
06/08/2021
STATE OF UTAH

	DATE	REVISION
1	5-03-21	PR-004
2	5-11-21	PR-004 BVNA comments

PROJECT NUMBER 18136

OPERATING FLOOR - POWER PLAN

E-101-3 2

05/18/2022 3:08:45 PM

(OPEN TO BELOW)

(OPEN TO BELOW)

(OPEN TO BELOW)

(OPEN TO BELOW)

ACCESS HATCH

SHIPS LADDER UP TO ROOF ACCESS

V-100

DA-1

MTS-1

LP1

MCC-1

MCC-2

ELECTRICAL ROOM

ATS-1

R-G

RTU-U

BC-1

MSP

BATTERY CABINET

BATTERY CABINET

P-8A

P-8B

T-GA

DC-2

BC-2

FFP1A (5)

TF-P1A

EXISTING LIGHT SWITCH (6)

D-21

D-21

D-21

NEW STAIRWAY

HOIST OPENING

4 (TYPICAL)

D-21

D-21

2 (TYPICAL)

D-21

21

ED-1
NORTH EXPANSION DRUM

ED-2
SOUTH EXPANSION DRUM

SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. COORDINATE TIMING OF REMOVALS WITH OTHER TRADES. EXISTING EQUIPMENT MUST REMAIN FUNCTIONAL UNTIL THE TIME OF SCHEDULED OUTAGE. NOTIFICATION SHALL BE PROVIDED TO THE UNIVERSITY REPRESENTATIVE A MINIMUM OF TWO WEEKS PRIOR TO SHUT DOWN OF POWER TO EXISTING EQUIPMENT. ACCOMPLISH ALL PREP WORK PRIOR TO OUTAGE TO MINIMIZE THE OUTAGE TIME FRAME. SUBMIT A DETAILED METHOD OF PROCEDURE (MOP) FOR ALL OUTAGES FOUR WEEKS PRIOR TO OUTAGE. PERFORM OUTAGES DURING OFF HOURS AT A TIME ACCEPTABLE BY THE OWNER.
3. PROVIDE TEMPORARY POWER FOR ALL CONSTRUCTION NEEDS.
4. PATCH AND PAINT ANY DAMAGED SURFACES DUE TO DEMOLITION AND CONSTRUCTION TO MATCH EXISTING CONDITIONS. SEAL ALL PENETRATIONS THROUGH RATED CEILINGS AND WALLS WITH UL LISTED SEALANTS AND FIRESTOPPING MATERIALS.
5. THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. DATA PRESENTED ON THIS DRAWING IS AS ACCURATE AS CAN BE DETERMINED, BUT ACCURACY IS NOT GUARANTEED. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NEITHER RESPONSIBLE FOR ITS ACCURACY, NOR ERRORS NOR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DOCUMENTS. FIELD VERIFICATION OF ALL AFFECTED COMPONENTS IS REQUIRED.

KEY NOTES

1. RELOCATE BRANCH CIRCUIT CONDUITS TO ACCOMMODATE STAIR CONSTRUCTION.
2. PROVIDE MATERIALS TO PROTECT LIGHTING AND EQUIPMENT IN THIS ROOM FROM DAMAGE CAUSED BY CONSTRUCTION OR WEATHER EXPOSURE.
3. REMOVE LIGHT FIXTURE DURING STAIR CONSTRUCTION. REINSTALL LIGHT FIXTURE UNDER NEW STAIRWAY. MOUNT AT A MINIMUM HEIGHT OF 9-FEET TO BOTTOM OF FIXTURE
4. FIXTURES IN THIS ROOM SHALL REMAIN OPERATIONAL THROUGHOUT CONSTRUCTION SCHEDULE. LIGHTING IN THIS AREA SERVED BY PANEL D ON THE OPERATING FLOOR.
5. THIS PANEL INSTALLED UNDER A DIFFERENT PROJECT SCOPE. COORDINATE CIRCUIT CONNECTION SCHEDULE WITH INSTALLATION OF PANEL.
6. REPLACE EXISTING SWITCH WITH A NEW FOUR-WAY SWITCH. COORDINATE LIGHTING CONTROL WITH NEW PENTHOUSE THREE-WAY SWITCH.

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

8-23-2021

1 FAN FLOOR - LIGHTING PLAN
SCALE: 1/4" = 1'-0"

PLAN NORTH

TRUE NORTH

6/8/2021 9:27:03 AM

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering + green future
MECHANICAL · ELECTRICAL
INDUSTRIAL + SUSTAINABLE DESIGN
12600 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
R&H Group project number

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3

SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

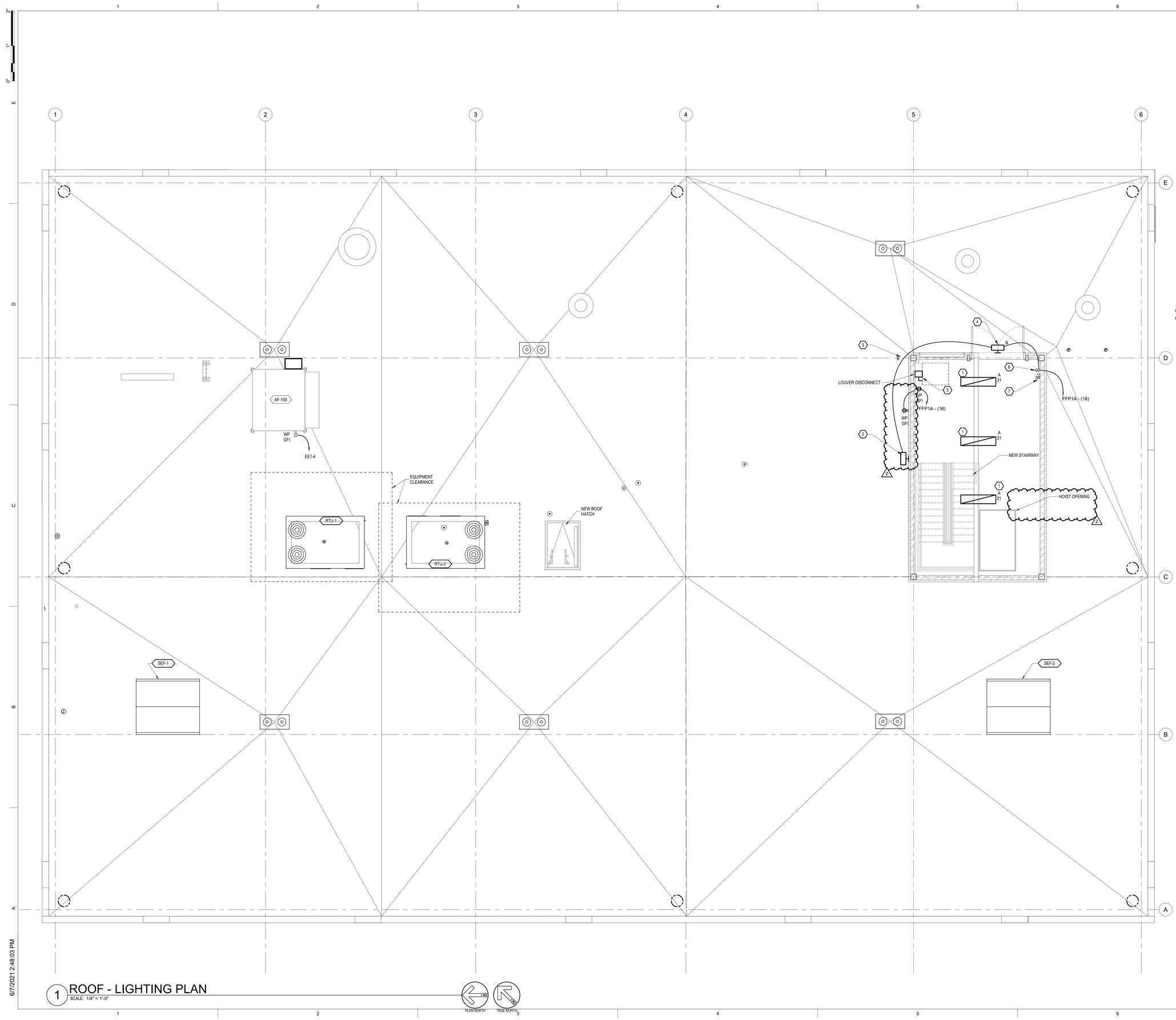
LICENSED PROFESSIONAL ENGINEER
No. 9736512-2202
DANIEL V. SANDBLOM
06/08/2021
STATE OF UTAH

	DATE	REVISION
1	5-03-21	PR-004
2	5-11-21	PR-004 BVNA comments

PROJECT NUMBER 18136

FAN FLOOR - LIGHTING PLAN

EL-103-3 1



SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. PROVIDE TEMPORARY POWER FOR ALL CONSTRUCTION NEEDS.
3. SURFACE MOUNT PENTHOUSE ELECTRICAL EQUIPMENT AND CONDUIT TO THE INSULATED METAL PANELS. PAINT CONDUIT AND DEVICE BOXES TO MATCH PANEL SURFACE. SEAL ALL WALL PENETRATIONS WATER TIGHT.
4. THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. DATA PRESENTED ON THIS DRAWING IS AS ACCURATE AS CAN BE DETERMINED, BUT ACCURACY IS NOT GUARANTEED. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NEITHER RESPONSIBLE FOR ITS ACCURACY, NOR ERRORS NOR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DOCUMENTS. FIELD VERIFICATION OF ALL AFFECTED COMPONENTS IS REQUIRED.

KEY NOTES

1. MOUNT LIGHT FIXTURES TO PENTHOUSE STRUCTURE. CONNECT FIXTURES TO LIGHTING CIRCUIT BELOW. FIXTURES TO BE CONTROLLED WITH THE FAN FLOOR LIGHTING.
2. MOUNT RECEPTACLE AT +48-INCHES AFF.
3. MOUNT FIXTURE AT +8-FEET TO CENTER AFF.
4. MOUNT FIXTURE ABOVE DOORWAY.
5. LOUVER DISCONNECT FED FROM PANEL FFP1A. SEE SHEET EL-103-3 FOR PANEL LOCATION.
6. OUTSIDE TYPE B FIXTURES SHOWN SHALL BE CONTROLLED BY SWITCH AND INTEGRAL PHOTOCELL.
7. PROVIDE THREE-WAY SWITCH. ROUTE TRAVELERS AND LIGHTING CIRCUIT EXTENSION TO NEW SWITCH AND FIXTURES

1 ROOF - LIGHTING PLAN
SCALE: 1/4" = 1'-0"

PLAN NORTH / TRUE NORTH

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

8-23-2021

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
engineering + green future
MECHANICAL · ELECTRICAL
INDUSTRIAL · SUSTAINABLE DESIGN
12600 West Colfax Avenue
Lakewood, Colorado 80215
Phone 303.239.0909
Fax 303.239.0918
www.rmhgroup.com
RMH Group project number 19977

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436 - PHASE 3
SALT LAKE CITY UTAH
PERMIT SET - 12-16-2020

LICENSED PROFESSIONAL ENGINEER
No. 9788512-2202
DANIEL V SANDBLOM
06/08/2021
STATE OF UTAH

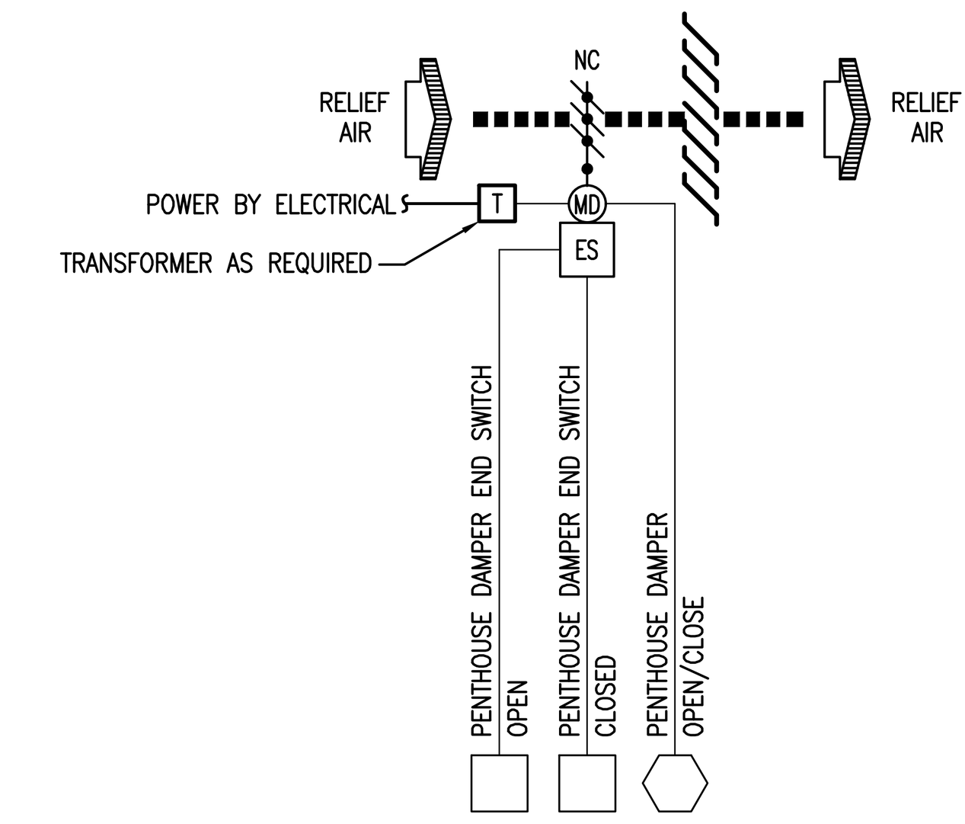
	DATE	REVISION
1	5-03-21	PR-004
2	5-11-21	PR-004 BVNA comments

PROJECT NUMBER 18136

ROOF-LIGHTING PLAN

EL-104-3 ⚠

05/18/2022 3:08:45 PM



CONTROLS CONNECTED TO THE JOHNSON DDC SYSTEM.

1 M-601-3 PENTHOUSE LOUVER DAMPER CONTROL DIAGRAM

DAMPER IS INTENDED TO BE OPENED TO RELEASE HEAT FROM THE BUILDING. THE CONTROLS SHALL BE CONNECTED TO THE JOHNSON CONTROLS INC. DDC SYSTEM. A DAMPER CONTROL DIAGRAM SHALL BE ADDED TO THE SYSTEM GRAPHICS/USER INTERFACE. DAMPER POSITION SHALL BE SELECTED BY OPERATOR, NO AUTOMATED SEQUENCE OF OPERATION IS REQUIRED AT THIS TIME.

Phase 4 Addendum #1 Alt. #2
Re-issued for bidding on
5/17/2022

~~8-23-2021~~

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

RMH GROUP
MECHANICAL, ELECTRICAL, INDUSTRIAL + SUSTAINABLE DESIGN

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ.#22436 - PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

STATE OF UTAH · JEFFREY W ELSNER · PROFESSIONAL ENGINEER · 5-6-21

△	DATE	REVISION
1	5-03-21	PR-004

PROJECT NUMBER

MECHANICAL CONTROLS

M-601-3

5/7/2019 11:13:15 AM

SEISMIC MASS KEY PLAN

PIPING FLOOR

80 PSF (8 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 5 PSF (MISC. EQUIPMENT)
+ 10 PSF (STEEL FRAMING)
+ 88 PSF (6" CONC. SLAB & 1" WEARING SURFACE)
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 185 PSF

5 PSF GRATING
+ 10 PSF (STEEL FRAMING)
+ 30 PSF (3 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 5 PSF (MISC. EQUIPMENT)
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 52 PSF

20 PSF (2 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 37 PSF

10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
TOTAL = 15 PSF

10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
+ 40 PSF (5" L.W. CONC. SLAB W/ PLB DECK)
+2 PSF (FIRE SPRINKLER)
TOTAL = 57 PSF

NOTE: 405 PLF PERIMETER LOAD @ EACH LEVEL FOR WALL ENVELOPE.
27 PSF WALL WEIGHT W/ 15'-0" WALL HEIGHT.

FAN FLOOR

40 PSF (4 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 5 PSF (MISC. EQUIPMENT)
+ 10 PSF (STEEL FRAMING)
+ 125 PSF (6" CONC. SLAB & BEAM ENCASEMENT)
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 182 PSF

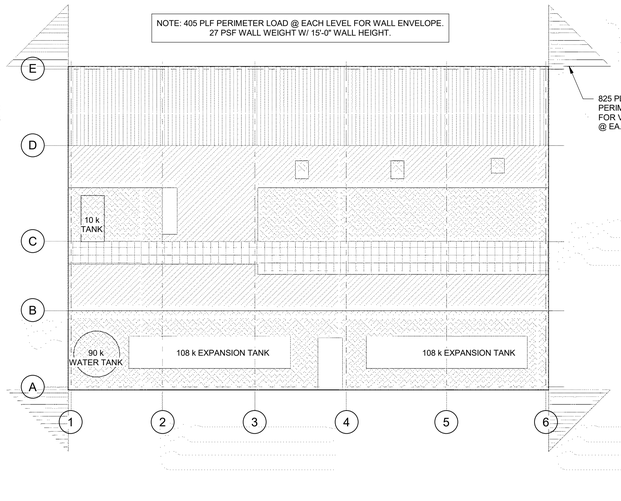
30 PSF (3 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
+ 5 PSF GRATING
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 52 PSF

20 PSF (2 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 37 PSF

10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
TOTAL = 15 PSF

20 PSF (2 PIPES @ 250 PLF EA. ACROSS 26' BAY)
+ 10 PSF (STEEL FRAMING)
+ 5 PSF (MISC. EQUIPMENT)
+ 50 PSF (4" SHOTCRETE)
+ 2 PSF (FIRE SPRINKLER)
TOTAL = 87 PSF

NOTE: 405 PLF PERIMETER LOAD @ EACH LEVEL FOR WALL ENVELOPE.
27 PSF WALL WEIGHT W/ 15'-0" WALL HEIGHT.

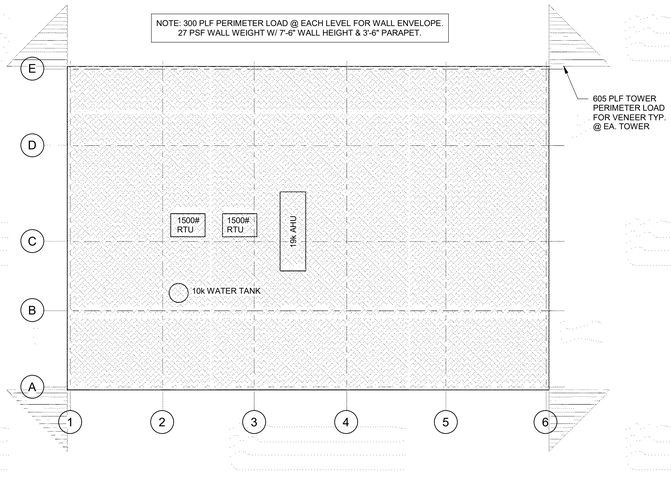


ROOF

10 PSF (1 PIPE @ 250 PLF EA. ACROSS 26' BAY)
+ 10 PSF (STEEL FRAMING)
+ 5 PSF (METAL DECK & MISC. ROOFING)
+ 2 PSF (FIRE SPRINKLER)
+ 1 PSF (COLLATERAL)
+ 7 PSF (SEISMIC SNOW)
TOTAL = 35 PSF

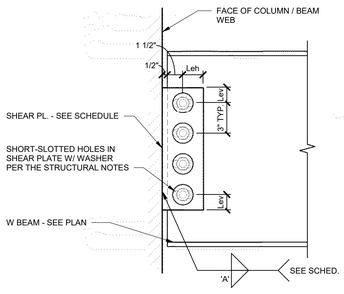
10 PSF (STEEL FRAMING)
+ 3 PSF (MISC. EQUIPMENT)
+7 PSF (SEISMIC SNOW)
TOTAL = 20 PSF

NOTE: 300 PLF PERIMETER LOAD @ EACH LEVEL FOR WALL ENVELOPE.
27 PSF WALL WEIGHT W/ 7'-6" WALL HEIGHT & 3'-6" PARAPET.



BEAM CONNECTION SCHEDULE

BEAM DEPTH	SHEAR PLATE INFORMATION: PL. DIMENSIONS W/ SHORT-SLOTTED HOLES	SHEAR PLATE INFORMATION: Lev	SHEAR PLATE INFORMATION: Leh	BOLTS W/ STANDARD WASHERS OVER SLOTS: No.	BOLTS W/ STANDARD WASHERS OVER SLOTS: SIZE	WELD 'A'	COMMENTS
W8 x, W10 x, C8 x	PL. 1/4" x 4"	1 1/2"	2"	2	3/4" Ø	3/16"	
W12 x, C12 x	PL. 5/16" x 4"	1 1/2"	2"	3	3/4" Ø	1/4"	
W14 x 90 & LIGHTER	PL. 5/16" x 4"	1 1/2"	2"	3	3/4" Ø	1/4"	
W16 x 77 & LIGHTER	PL. 5/16" x 4"	1 1/2"	2"	4	3/4" Ø	1/4"	
W18 x 65 & LIGHTER	PL. 5/16" x 4"	1 1/2"	2"	5	3/4" Ø	1/4"	
W21 x 73 & LIGHTER	PL. 5/16" x 4"	1 1/2"	2"	6	3/4" Ø	1/4"	
W24 x 94 & LIGHTER	PL. 3/8" x 4"	1 1/2"	2"	7	7/8" Ø	1/4"	



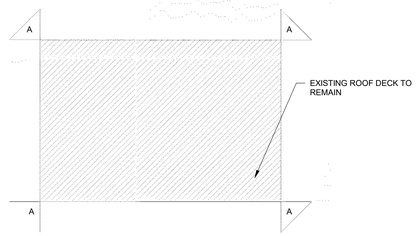
ROOF DECK SCHEDULE (L)

AREA	DECK: DEPTH	DECK: TYPE	DECK: GA.	ATTACHMENT: SUPPORTS: HILTI FASTENER	ATTACHMENT: SUPPORTS: PATTERN	ATTACHMENT: SIDE SEAMS: #12 TEK SCREWS	ATTACHMENT: SIDE SEAMS: TOP SEAM WELD	ATTACHMENT: SIDE SEAMS: PUNCH LOCK'	ATTACHMENT: SUPPORTS PARALLEL TO FLUTES: HILTI FASTENER	ATTACHMENT: SUPPORTS PARALLEL TO FLUTES: SPA.	MIN. SHEAR CAPACITY	MAX. FLEXIBILITY FACTOR
A	1 1/2"	B	18	ENP19	36/7/4	---	---	18"o.c.	ENP19	18"o.c.	1212 plf	6 + 3R

FASTENING PATTERNS

FASTENER PATTERN : 36/7/4

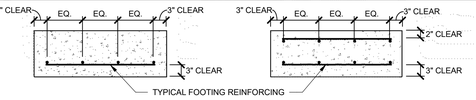
NOTES :
1. USE NESTABLE (OVERLAPPING) SIDE SEAMS AT SCREW ATTACHMENTS AND INTERLOCKING SIDE SEAMS AT WELDS.
2. ALL DECK WITH A PROFILE DEPTH OF 2" OR LESS SHALL HAVE NESTED OR TELESCOPED END LAPS.
3. SUBMIT CURRENT ICC APPROVAL FOR ALL DECKS.
4. ALTERNATE SYSTEMS SHALL MEET OR EXCEED THE MINIMUM SHEAR CAPACITY AND SHALL PROVIDE LESS THAN OR EQUAL TO THE MAXIMUM FLEXIBILITY FACTOR LISTED IN THE SCHEDULE.
5. ALL ALTERNATE SYSTEMS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.



KEY PLAN

FOOTING SCHEDULE

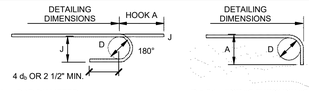
MARK	WIDTH	LENGTH	THICK	LENGTHWISE REINF.: NO.	LENGTHWISE REINF.: SIZE	CROSSWISE REINF.: NO.	CROSSWISE REINF.: SIZE	CROSSWISE REINF.: SPA.	REMARKS
FC2	2'-0"	CONT.	12"	(2)	#5	--	--	--	NOT IN PHASE 3
F4	4'-0"	4'-0"	12"	(4)	#5	(4)	#5	--	NOT IN PHASE 3
GB1	48"	CONT.	18"	(12)	#8	--	--	--	SEE 4/S-201-3
GB2	48"	CONT.	30"	(18)	#8	--	--	--	SEE 2/S-201-3
PC1	60"	60"	60"	--	--	--	--	--	SEE 5/S-201-3 FOR REINF.
PC2	48"	60"	34"	--	--	--	--	--	SEE 3/S-203-3 FOR REINF.
PC3	90"	102"	60"	--	--	--	--	--	SEE 8/S-201-3 FOR REINF.
PC4	78"	90"	60"	--	--	--	--	--	SEE 8/S-201-3 FOR REINF.
PC5	64"	60"	34"	--	--	--	--	--	SEE 3/S-203-3 FOR REINF.



TYP. FOOTING SECTION

TYP. FOOTING SECTION W/ TOP & BOTTOM REINF.

STANDARD HOOK & BEND SCHEDULE



d_b = BAR DIAMETER
D = FINISHED INSIDE BEND DIAMETER

D = $6d_b$ FOR #3 THROUGH #8
D = $8d_b$ FOR #9 THROUGH #11

BAR SIZE	DIMENSION OF STANDARD 180-DEG HOOKS, ALL GRADES: A	J	D	DIMENSION OF STANDARD 90-DEG HOOKS, ALL GRADES: A	D
#3	5"	3"	2 1/4"	6"	2 1/4"
#4	6"	4"	3"	8"	3"
#5	7"	5"	3 3/4"	10"	3 3/4"
#6	8"	6"	4 1/2"	1'-0"	4 1/2"
#7	10"	7"	5 1/4"	1'-2"	5 1/4"
#8	11"	8"	6"	1'-4"	6"
#9	1'-3"	11 3/4"	9 1/2"	1'-7"	9 1/2"
#10	1'-5"	1'-1 1/4"	10 3/4"	1'-10"	10 3/4"
#11	1'-7"	1'-2 3/4"	12"	2'-0"	12"

LEGEND OF SYMBOLS AND ABBREVIATIONS

AB = ANCHOR BOLT
ABV = ABOVE
ARCH = ARCHITECT
BLW = BELOW
BRB = BUCKLING RESTRAINED BRACE
BRBF = BUCKLING RESTRAINED BRACE FRAME
CJP = COMPLETE JOINT PENETRATION
CL = CENTERLINE
COL = COLUMN
CONC = CONCRETE
CP = CONCRETE PIER
DC = DEMAND CRITICAL
DIA / Ø = DIAMETER
DBA = DEFORMED BAR ANCHOR
DBE = DECK BEARING ELEVATION
ELEV = ELEVATION
EMU = EXISTING MEMBER UPGRADE
EOD = EDGE OF DECK
FDN = FOUNDATION
FTG = FOOTING
FFE = FINISHED FLOOR ELEVATION
GB = CONCRETE GRADE BEAM
HSA = HEADED STUD ANCHOR
KB = KICKER BRACE
MAX = MAXIMUM
MECH = MECHANICAL
MIN = MINIMUM
NS, FS = NEAR SIDE, FAR SIDE
OAE = OR APPROVED EQUAL
OPP = OPPOSITE
PAF = POWDER ACTUATED FASTENER
PL = PLATE
REINF = REINFORCING
REQ'D = REQUIRED
SIM = SIMILAR
TOB = TOP OF BEAM ELEVATION
TOC = TOP OF CONCRETE SLAB
TOF = TOP OF FOOTING
TOG = TOP OF GIRDER ELEVATION
TOS = TOP OF STEEL ELEVATION
TYP = TYPICAL
UNO = UNLESS NOTED OTHERWISE
NIC = NOT IN CONTRACT
(E) = EXISTING
(N) = NEW
VPG = VERTICAL PILE GROUP
HPG = HORIZONTAL PILE GROUP

FOOTING MARK
TOP OF FOOTING ELEV.
SECTION MARK
SHEET NUMBER
TOP OF FOUNDATION WALL OR COLUMN PIER ELEV.
FOOTING STEP
DEPRESS FDN./WALL AND POUR FLOOR SLAB OVER AT CONCRETE FOUNDATION WALL
CONCRETE BEAM
ELEVATION
L — FRAMING ANGLE SEE TYPICAL DETAIL
C — FRAMING CHANNEL SEE TYPICAL DETAIL
L — ITEMS, DETAILS, & SYSTEMS WHICH ARE PART OF THE LATERAL FORCE RESISTING SYSTEM.
MOMENT RESISTING CONNECTIONS - SEE DETAIL
MOMENT RESISTING CANTILEVER CONNECTIONS - SEE DETAIL
KB — KICKER BRACE
EMU-# — UPGRADE ON EXISTING W BEAM - SEE SCHEDULE
NOT IN CONTRACT
DIRECTION DECK IS SPANNING

Phase 4 Addendum #1 Alt. #2 Re-issued for bidding on 5/17/2022

8-23-2021

FFKR ARCHITECTS
730 Pacific Avenue · Salt Lake City, Utah 84104
O 801.521.6186 · FFKR.COM

50 Years 1969 - 2019 ENGINEERS
structural consultants
1384 W. Park Cir. Ogden, Utah 84404
ph: 801.782.6008 fx: 801.782.4656

U OF U BLDG. 303 SEISMIC UPGRADE, PROJ. #22436- PHASE 3
SALT LAKE CITY UTAH

PERMIT SET - 12-16-2020

PROFESSIONAL STRUCTURAL ENGINEER
12/10/20
No. 276196
Robert M. Moyle
STATE OF UTAH

△	DATE	REVISION
3	2/19/21	PR #2
5	5/10/21	PR #4

PROJECT NUMBER 18923

SCHEDULES

SG-002

`

TABLE OF CONTENTS

Phase 4 Addendum #1 Alt. #2
Reissue for bidding on 5/17/2022

Phase 4 Addendum #1 Alt. #2
Reissue for bidding on 5/17/2022

SECTION 05 5119 - METAL GRATING STAIRS

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. Industrial Class stairs with steel-grating treads.

B. Related Sections:

1. Section 05 5213 "Pipe and Tube Railings." For railings attached to metal grating stairs.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs, railings, and guards.

1. 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.
2. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For metal grating stairs and the following:

1. Gratings.
2. Shop primer products.
3. Grout.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.

C. Delegated-Design Submittal: For stairs, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State of Utah.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

    a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design stairs, including attachment to building construction.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft.
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.

3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360.

C. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Bars for Grating Treads: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

D. Steel Wire Rod for Grating Crossbars: ASTM A510/A510M.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.

1. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Shop Primers: Provide primers that comply with Section 09 9600 "High-Performance Coatings."

C. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding 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 Finish # 3 - Partially dressed weld with spatter removed.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that are exposed to weather in a manner to exclude water.

2.6 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel channels.

    a. Stringer Size: Match existing, unless larger size is needed to comply with "Performance Requirements" Article.
    b. Provide closures for exposed ends of channel stringers.
    c. Finishes: Painted.

2. Construct platforms and tread supports of steel channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.

    a. Provide closures for exposed ends of channel framing.
    b. Finish: Painted.

3. Weld stringers to headers; weld framing members to stringers and headers.

C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."

1. Fabricate treads and platforms from welded steel grating with 1-1/4-by-3/16-inch bearing bars at 15/16 inch o.c. and crossbars at 4 inches o.c. Treads are intended to match existing.

    a. Surface: Plain.
    b. Finishes: Match existing tread finish.

2. Fabricate grating platforms with nosing matching that on grating treads.

    a. Secure grating to platform framing by welding.
    b. Paint nosings safety yellow.

D. Risers: Open.

E. Toe Plates: Provide toe plates around openings and at edge of open-sided floors and platforms, and at open ends and open back edges of treads.

1. Material and Finish: Steel plate to match finish of other steel items.
2. Fabricate to dimensions and details indicated.

2.7 FINISHES

A. Finish metal stairs after assembly.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

C. Apply shop primer to uncoated surfaces of metal railing components, except those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

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

3.2 INSTALLATION OF METAL STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.

a. Clean bottom surface of baseplates.
b. Set steel-stair baseplates on wedges, shims, or leveling nuts.
c. After stairs have been positioned and aligned, tighten anchor bolts.
d. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.

e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

1) Neatly finish exposed surfaces; protect grout and allow to cure.
2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Comply with requirements for welding in "Fabrication, General" Article.

3.3 REPAIR

A. Touchup Painting for Railings: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9600 "High-Performance Coatings."

END OF SECTION 05 5119

SECTION 05 5213 - PIPE AND TUBE RAILINGS

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. Steel pipe and tube interior railings.
2. Removeable steel pipe and tube railings

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. 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. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

D. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.

E. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

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

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Steel Pipe and Tube Railings: Intention is to match design of existing railings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hollaender Mfg. Co.
b. Kee Safety, Inc.
c. R & B Wagner, Inc.
d. Tuttle, a Dant Clayton Division.
e. VIVA Railings, LLC.
f. Local custom fabricator approved by Architect prior to bid.

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails, Intermediate Rails 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.

2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.4 STEEL AND IRON

A. Tubing: ASTM A500 (cold formed) or ASTM A513.

B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A36/A36M.

2.5 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5 for zinc coating.

B. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

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

B. Shop Primers: Provide primers that comply with Section 09 9600 "High-Performance Coatings."

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

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. Shop assemble railings 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.

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. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. 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.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Form Changes in Direction as Follows:

1. As detailed.

J. Close exposed ends of railing members with prefabricated end fittings.

K. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

L. 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.

M. 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 STEEL AND IRON FINISHES

A. For railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

C. Shop-Painted Finish: Comply with Section 09 9600 "High-Performance Coatings."

PART 3 - EXECUTION

3.1 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 are 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. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

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.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ANCHORING POSTS

A. 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, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

C. Weld posts to metal supporting members.

D. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9600 "High-Performance Coatings."

3.5 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.

END OF SECTION 05 5213

SECTION 05 5313 - BAR GRATINGS AND CATWALKS

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. Metal bar catwalk gratings and metal frames and supports for catwalk gratings.

B. Related Requirements:

1. Section 05 1200 "Structural Steel Framing" for structural-steel framing system components.
2. Section 05 5119 "Metal Grating Stairs" for grating treads and landings of steel-framed grating stairs.
3. Section 05 5213 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.3 COORDINATION

A. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Clips and anchorage devices for gratings.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For gratings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

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

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

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fisher & Ludlow; a NUCOR Company.
2. Grating Pacific, Inc.
3. Harsco Industrial IKG, a division of Harsco Corporation.
4. MLP Steel Company; Laurel Steel Products Division.
5. Ohio Gratings, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design gratings.

B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Floors: Uniform load of 125 lbf/sq. ft. or concentrated load of 2000 lbf, whichever produces the greater stress.
2. Limit deflection to L/360 or 1/4 inch, whichever is less.

C. Seismic Performance: Gratings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.3 METAL BAR GRATINGS

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual " and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."

B. Welded Steel Grating: Intension is to match existing gratings.

1. Bearing Bar Spacing: 1-3/16 inches o.c.

2. Bearing Bar Depth: 3/4 inch, but not less than as required to comply with structural performance requirements.
3. Bearing Bar Thickness: 1/8 inches, but not less than as required to comply with structural performance requirements.
4. Crossbar Spacing: 4 inches o.c.
5. Traffic Surface: Plain.
6. Steel Finish: Shop primed.

2.4 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Bars for Bar Gratings: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

C. Wire Rod for Bar Grating Crossbars: ASTM A510.

2.5 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563 and flat washers.

C. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

A. 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.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.7 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling

limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material 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.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
2. Toeplate Height: 4 inches unless otherwise indicated.

G. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.

H. Do not notch bearing bars at supports to maintain elevation.

2.8 GRATING FRAMES AND SUPPORTS

A. Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

2.9 STEEL FINISHES

A. Finish gratings, frames, and supports after assembly.

B. Shop prime gratings, frames, and supports unless otherwise indicated.

1. Shop prime with universal shop primer primers specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting" unless primers specified in Section 09 9600 "High-Performance Coatings" are indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Attach toeplates to gratings by welding at locations indicated.

F. Field Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 5313

SECTION 07 4215 - INSULATED METAL WALL PANELS

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. Foamed-insulation-core metal wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical metal panel assembly, including corner, supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E72:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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.

2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

1. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.

a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.
b. Density: 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D1622.
c. Compressive Strength: Minimum 20 psi when tested according to ASTM D1621.

d. Shear Strength: 26 psi when tested according to ASTM C273/C273M.

B. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CENTRIA.
b. Kingspan Insulated Panels.
c. MBCI.
d. Metl-Span.

2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

a. Nominal Thickness: 0.028 inch.
b. Exterior Finish: Two-coat fluoropolymer.

1) Color: As selected by Architect from manufacturer's full range.

c. Interior Finish: Siliconized polyester.

1) Color: As indicated by manufacturer's designations As selected by Architect from manufacturer's full range.

3. Backer Board: On back side of exterior facing.
4. Panel Coverage: 36 inches nominal.
5. Panel Thickness: 3.0 inches.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or

premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Backer Board: Hardboard complying with ANSI A135.4, Class 1 tempered, 1/8 inch thick unless otherwise indicated.

D. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2-inch-wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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 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. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

    a. Verify that weather barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

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

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."

3.4 INSULATED METAL WALL PANEL INSTALLATION

A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.

1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.

B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.

1. Install clips to supports with self-tapping fasteners.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

D. Metal wall panels will be considered defective if they do not pass test and inspections.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 4215

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

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. Formed low-slope roof sheet metal fabrications.
2. Formed equipment support flashing.

B. Related Requirements:

1. Section 06 1053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 07 5419 “Polyvinyl-Chloride (PVC) Roofing” for installation of sheet metal flashing and trim integral with roofing.
3. Section 07 7200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, and other manufactured roof accessory units.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.
8. Include details of special conditions.
9. Include details of connections to adjoining work.
10. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.

E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. FM Approvals Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: ASTM A480/A480M, No. 4 (polished directional satin).

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1) Run grain of directional finishes with long dimension of each piece.
2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet in

accordance with ASTM A792/A792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A755/A755M.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finish:

    a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: As selected by Architect from manufacturer's full range.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Carlisle WIP Products; a brand of Carlisle Construction Materials; WIP 300HT.
    b. GCP Applied Technologies Inc., Grace Ice and Water Shield HT.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.

1. Coping Profile: Profile as indicated in Drawings, in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Joint Style: Butted with expansion space and 6-inch-wide, exposed cover plate.
3. Fabricate from the following materials:

a. Galvanized Steel: 0.040 inch thick.

B. Drip Edges: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

D. Flashing Receivers: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.

F. Roof-Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

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

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

B. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp joints not less than 4 inches.

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

    a. Embed hooked flanges of joint members not less than 1 inch into sealant.
    b. Form joints to completely conceal sealant.
    c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
    d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."

3.4 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.

   a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
   b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

3.8 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 6200

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

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. Exterior standard steel doors and frames.

B. Related Requirements:

1. Section 08 7100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of door type.
2. Details of door, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.

C. Samples for Verification:

1. Fabrication: Prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:

   a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement.
   b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.

B. Field quality control reports.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; ASSA ABLOY.
2. Curries Company; ASSA ABLOY.
3. Custom Metal Products.
4. DCI Hollow Metal.
5. Deansteel Manufacturing Company, Inc.
6. Fleming Door Products Ltd.; Assa Abloy Group Company.
7. Megamet Industries, Inc.
8. Mesker Door Inc.
9. MPI Group, LLC (The).
10. North American Door Corp.
11. Philipp Manufacturing Co (The).
12. Pioneer Industries.
13. Premier Products, Inc.
14. Republic Doors and Frames.
15. Rocky Mountain Metals, Inc.
16. Shanahan's Manufacturing Limited.
17. Steelcraft; an Allegion brand.

2.2 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. when tested according to ASTM C518.

2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

1. Doors:

a. Thickness: 1-3/4 inches.
b. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (nominal 16 gage), with minimum A40 coating.
c. Edge Construction: Model 2, Seamless.
d. Edge Bevel: Provide manufacturer's standard beveled or square edges.
e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.

f. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
g. Core: Polyisocyanurate.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (nominal 16 gage), with minimum A40 coating.
b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.5 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.

2.6 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

    a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.

2. Floor Anchors: Secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.

3.3 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 1113

SECTION 08 7100 - DOOR HARDWARE

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. Mechanical door hardware for the following:

a. Swinging doors.

1.3 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule after or concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Fastenings and other installation information.
e. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
f. Mounting locations for door hardware.
g. List of related door devices specified in other Sections for each door and frame.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Products: Subject to compliance with requirements, provide the following Basis of Design Product or an equivalent product, approved by Architect, by one of the other following Manufacturers:

a. Basis of Design: Allegion plc; Ives 5BB1 Series.
b. Hager Companies BB1279.
c. McKinney: TB2714.

d. Stanley Commercial Hardware; a division of Stanley Security Solutions: FBB179.

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Lock Trim:

1. Description: As scheduled.
2. Levers: Powder coated, simulating cast bronze.

a. As scheduled.

3. Escutcheons (Roses): Powder coated simulating wrought bronze.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Bored Locks: BHMA A156.2; Grade 2; Series 4000.

1. Products: Subject to compliance with requirements, provide the following Basis of Design Product or an equivalent product, approved by Architect, by one of the other following Manufacturers:

a. Basis of Design: Allegion plc; Schlage ND Series, Rhodes Lever.

2.4 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Perimeter Seals

a. Products: Subject to compliance with requirements, provide the following Basis of Design Product or the equivalent product indicated below by one of the other indicated Manufacturers:

1) Basis of Design: Zero International, Inc; 429D-S.
2) National Guard Products, Inc.; 700SA.
3) Pemko Manufacturing Co; 2891AS.

b. Size weather strip and gasket to provide a continuous seal around opening and at meeting stiles.

2. Meeting Stile Astragals:

a. Products: Subject to compliance with requirements, provide the following Basis of Design Product or the equivalent product indicated below by one of the other indicated Manufacturers:

1) Basis of Design: Zero International, Inc; 188SBK.
2) National Guard Products, Inc; 5050B
3) Pemko Manufacturing Co; S88D

3. Door Bottoms or Sweeps:

a. Products: Subject to compliance with requirements, provide the following Basis of Design Product or the equivalent product indicated below by one of the other indicated Manufacturers:

1) Basis of Design: Zero International, Inc; 39D,
2) National Guard Products, Inc; 200NA.
3) Pemko Manufacturing Co; 3452CB.

B. Maximum Air Leakage: When tested according to ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:

1. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

2.5 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Products: Subject to compliance with requirements, provide the following Basis of Design Product or an equivalent product, approved by Architect, by one of the other following Manufacturers:

a. Basis of Design: Zero International, Inc; 655D-223.
b. National Guard Products, Inc. 425HD.
c. Pemko Manufacturing Co; 1715A.

2.6 SILENCERS

A. Silencers: Installed as specified in Section 08 1113 “Hollow Metal Doors and Frames.”

1. Products: Subject to compliance with requirements, provide the following Basis of Design Product or an equivalent product, approved by Architect, by one of the other following Manufacturers:

a. Basis of Design: Allegion plc, Ives; SR64/65.

b. Hager Companies.
c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
d. Trimco.

2.7 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.8 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, wall and floor construction, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 9200 "Joint Sealants."

E. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

F. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.5 DOOR HARDWARE SCHEDULE

Hardware Set 1: Door to have the following:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	613	IVE
1	EA	PASSAGE LOCK	ND10S RHO	626	SCH
1	EA	GASKETING	188SBK (ASTRAGAL)	BK	ZER
1	SET	GASKETING	429D-S	D	ZER
1	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	655D-223	D	ZER

END OF SECTION 08 7100

05/18/2022 3:08:53 PM

Phase 4 Addendum #1 Alt. #2
Reissue for bidding on 5/17/2022

SECTION 09 9600 - HIGH-PERFORMANCE COATINGS

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 surface preparation and the application of high-performance coating systems on the following substrates:

1. Exterior Substrates:

    a. Galvanized metal doors.
    b. Steel door frames.

2. Interior Substrates:

    a. Steel railings and grating stair nosings.

1.3 DEFINITIONS

A. MPI Gloss Level 5 (semi-gloss): 35 to 70 units at 60 degrees, according to ASTM D523.

B. MPI Gloss Level 6 (gloss): 70 to 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Shop-Applied Primer Verification for Steel: Provide written verification that shop surface preparation and specified shop primer was applied as specified in this Section or in the steel specification sections.

C. Samples for Initial Selection: For each type of topcoat product indicated.

D. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.

2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups 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. Architect will select one surface to represent surfaces and conditions for application of each coating system.

   a. Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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 ambient 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. PPG Paints.
3. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

1. Equivalent Products: Substitutions of comparable products by other manufacturers will be considered prior to bid if the product complies with specified product requirements and is the same in quality and appearance to the specified product, as judged by the Architect.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be 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 paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

B. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Nonflat Paints and Coatings: 100 g/L.
2. Primers, Sealers, and Undercoaters: 100 g/L.
3. Rust-Preventive Coatings: 250 g/L.
4. Zinc-Rich Industrial Maintenance Primers: 340 g/L.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner may engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product 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.

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 the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 6/NACE No. 3.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

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. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

C. 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. Dry Film Thickness Testing: Owner may 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 to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, 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. Steel Substrates:

1. Pigmented Polyurethane System:

a. Prime Coat: Primer, rust inhibitive, water based MPI #107.

1) Sherwin-Williams: Pro Industrial: Pro-Cryl Universal Primer - B66W00310.
2) Equal, complying with requirements.

b. Intermediate Coat: Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.

c. Topcoat: Waterbased urethane, pigmented, gloss (MPI Gloss Level 6).

1) Sherwin-Williams: Pro Industrial; Waterbased Acrolon 100 Waterbased Urethane - B65-720 Series.
2) Equal, complying with requirements.

B. Galvanized-Metal Substrates:

1. Pigmented Polyurethane over Vinyl Wash Primer:

a. Prime Coat: Primer, vinyl wash.

1) Sherwin-Williams: DTM Wash Primer – B71Y0001.
2) Equal, complying with requirements.

b. Intermediate Coat: Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.

c. Topcoat: Waterbased urethane, pigmented, gloss (MPI Gloss Level 6).

1) Sherwin-Williams: Pro Industrial; Waterbased Acrolon 100 Waterbased Urethane - B65-720 Series.
2) Equal, complying with requirements.

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Epoxy-Modified Latex System:

   a. Prime Coat: Primer, rust inhibitive, water based, MPI #107.

      1) Sherwin-Williams: Pro Industrial; Pro-Cryl Universal Primer - B66W01310.
      2) Equal, complying with requirements.

   b. Intermediate Coat: Epoxy-modified latex, interior, gloss matching topcoat.
   c. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 3).

      1) Sherwin-Williams: Pro Industrial; Waterbased Catalyzed Eggshell Gloss - B73-300 Series.
      2) Equal, complying with requirements.

   d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6).

      1) Sherwin-Williams: Pro Industrial; Waterbased Catalyzed Epoxy Gloss - B73-300 Series.
      2) Equal, complying with requirements.

END OF SECTION 09 9600

05/18/2022 3:08:54 PM

Phase 4 Addendum #1 Alt. #2
Reissue for bidding on 5/17/2022

SECTION 23 0500 - COMMON WORK RESULTS FOR MECHANICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. All electrical work installed under Division 23 shall be in compliance with Division 26.

1.2 SUMMARY

A. This Section includes the following:

1. General requirements for all Division 23 sections
2. Piping materials and installation instructions common to most piping systems
3. Dielectric fittings
4. Mechanical sleeve seals
5. Sleeves
6. Grout
7. Electric motors
8. Motor controllers
9. Miscellaneous electrical equipment
10. Access Panels
11. Identification
12. Mechanical demolition
13. Equipment installation requirements common to equipment sections
14. Painting and finishing
15. Concrete bases
16. Supports and anchorages

1.3 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic in character indicating design concept and do not indicate every required duct or piping offset, valve, fitting, etc.

B. All drawings relating to this structure, together with these specifications, shall be considered in bidding and construction. The drawings and specifications are complementary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict or omission arise between the drawings and specifications, such conflict shall be brought to the attention of the Architect/ Engineer for resolution.

C. Unless otherwise indicated, all equipment and performance data listed is for job site conditions (elevation 4,700 feet).

D. Drawings are not to be scaled.

1.4 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.5 WIND AND SEISMIC CRITERIA

A. All system components must comply with the wind and seismic requirements of Division 23 Section "Wind, Seismic, and Vibration Controls for Mechanical Work". These include requirements for anchorage, internal, and attached/imbedded components. Included are the minimum 2015 International Building Code requirements plus additional criteria for this project. Systems requiring systems and components to be designated with a Component Importance Factor of 1.5 and requiring certification are tabulated in Division 23 Section "Wind, Seismic, and Vibration Controls for Mechanical Work".

B. Seismic Performance: All Mechanical systems designated with a component importance factor of 1.5, including all components and accessories, shall withstand the effects of earthquake motions.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.6 SUBMITTALS

A. Division 23 Submittal Data and Shop Drawings:

1. Refer to Division 1, for general submittal requirements.
2. Contractor agrees that shop drawings and/or submittals processed by the Engineer are not change orders; that the purpose of shop drawings and/or submittals by the Contractor is to inform the Engineer which equipment and materials he intends to furnish and install.

3. Submittals and/or shop drawings are to be edited to show specific data and all options for the Mechanical equipment that the Contractor intends to provide.
4. Submittals and/or shop drawings are to be identified with numbers or letters identical to those listed on the drawings and/or specifications.
5. All shop drawings for special systems (temperature controls, etc.) that will become permanent record documents shall be prepared on AutoCAD Version 2012 or later, using the same drawing size as the project construction documents.
6. Approved Manufacturers and Substitutions

    a. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.
    b. Substitution Requests prior to bid: Refer to Division 1. No prior approvals will be given by the Engineer unless specifically mentioned in these specifications.
    c. Substitution Requests after Execution of Contract: If Contractor wishes to furnish or use a substitute item of material and/or equipment he must submit a change order request to the Engineer. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number, and/or drawing number. A price change (increase or decrease) shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight, and other applicable data. Justification of substitution must be more than just cost justification. The Engineer will review the change order request for equality, suitability, and reasonableness of price differential. A single substitution change order listing the approved items will be issued with the net cost of the change order being the sum of the approved item costs. No subsequent substitution change orders will be considered. The Engineer's decision will be final.
    d. It shall be the responsibility of the Contractor to assure that the substitute material and/or equipment fits into the space provided and the Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions. No time extension will be allowed due to substitution on equipment.
    e. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.

7. Submittals Schedule:

    a. Comply with Division 1 construction progress documentation and submittal requirements and the additional submittal requirements specified below. . Unless otherwise specified in Division 1, comply with the submittal periods specified below. Engineer will schedule submittal reviews based upon submittal schedule. Failure to submit schedule may result in inability to review submittals within the periods stated in the submittal schedule. These delays shall not be cause for extension of Contact completion date.

        1) Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized

because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

2) Submit schedule within 14 days of commencement of work. Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
3) Allow 15 days for review of each resubmittal.
4) Submit a minimum of three copies of schedule. Arrange the following information in a tabular format:

a) Scheduled date for first submittal.
b) Specification Section number and title.
c) Submittal category (action or informational).
d) Name of subcontractor.
e) Description of the Work covered.
f) Scheduled date for Architect's final release of reviewed submittal.

8. Schedule of Deviations: Equipment and material submittals of approved manufacturers, including basis of design manufacture shall provide a written itemization of exceptions to the specification and deviations from the basis of design for all features, design, configuration, physical dimension, performance, and operation of the submitted product. Those elements not identified and itemized as exceptions in the submittal shall not be reviewed by the Engineer and shall be provided as specified.

B. Manufacturer Seismic Qualification Certification: Submit certification that equipment, mounted and separately mounted accessories and components meet the criteria specified in Division 23 "Wind, Seismic, and Vibration Controls for Mechanical Work" and will withstand the effects of earthquake motions determined according to ASCE 7 and remain operational.

1. Basis for Certification: State whether certification is based upon an actual test on a shake table, by three-dimensional shock tests, by an analytical method using dynamic characteristics and forces, by the use of experience data (i.e., historical data demonstrating acceptable seismic performance) or by a more rigorous analysis providing for equivalent safety.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Close-out Submittals:

1. Operating and Maintenance (O&M) Manual:

a. Provide O&M manuals in accordance with Division 1.
b. The Contractor shall prepare an operating and maintenance manual that shall cover all systems and equipment installed under this Division. Incorporate the standard technical literature into system-specific formats for this facility as designed and actually installed. The resulting manual shall also serve as the training manual and shall be specific, concise, to the point, and tailored specifically for this facility.

c. Unless specified otherwise in Division 1, the maintenance manual shall be submitted to the Engineer in draft form for approval prior to preparation of three copies for final submission to the Architect for delivery to the Owner.

d. The maintenance manual shall be 8-1/2" x 11" size and assembled in loose-leaf three-ring or post binder. Provide manufacturers' original literature. Facsimiles are not acceptable. The manual shall be adequately indexed and contain the following information:

1) Contractors' names, addresses, and telephone numbers.
2) Alphabetical list of all system components with the name and address and 24-hour phone number of the company responsible for servicing each item during the first year of operation.
3) Guarantees and warranties of all equipment whenever applicable.
4) All manufacturers' data that is applicable to the installed equipment, with appropriate highlighting, such as the following:

a) Shop drawings (latest copy)
b) Installation instructions
c) Lubrication instructions
d) Wiring diagrams

5) A simplified description of the operation of all systems including the function of each piece of equipment within each system including both normal and emergency operation. These descriptions shall be supported with a schematic flow diagram when applicable.

2. Record Drawings

a. Comply with record drawing requirements in Division 1.
b. Record Prints

1) All RFIs, change orders and other directives if not recorded on the contract drawings and amendments shall be red-lined on the record drawings. Record drawings simply tabulating the amendments onto the drawings shall be returned for clarification of installed conditions and red-line mark-up.

D. Non-Responsive Submittals: Submittals are intended to be reviewed in an initial submittal with comments corrected and submitted in a resubmittal. Non-responsiveness to the initial submittal comments in the resubmittal will result in return of the documents for correction and additional resubmittals. Any time charged by the Engineer in review of additional resubmittals due to non-responsiveness shall be deducted from the Contractor's billings.

E. Product Data: for the following:

1. Dielectric fittings
2. Mechanical sleeve seals
3. Motor Submittal Data: The following data shall be submitted for all motors:

a. Full load current and service factor running current at operating voltage.
b. Locked rotor current, starting power factor, and power factor at full load.

c. Efficiency at full load.
d. Data to substantiate Class F insulation with Class B rise at 100% load.
e. Full load speeds (rpm).
f. Enclosure type (ODP, TEFC, explosion proof, TENV, WPI, etc.)

Note: All tests (except locked rotor current) shall be made at full voltage and rated frequency.

4. Motor Controllers:

a. Torque, speed, and horsepower requirements of the load.
b. Ratings and characteristics of supply circuit and required control sequence.
c. Ambient and environmental conditions of installation location.

5. Capacitor size (KVAR) for maximum power factor correction at 95% lagging.
6. Identification: Submit product for each type of identification.

F. Certification:

1. Welding certificates
2. Certificates of Compliance for all Designated Seismic Systems.

G. Schedules:

1. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
2. Valve numbering scheme.
3. Valve Schedules: For each piping system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications" ASME Section VIII, and ANSI 313.

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current (within 6 months).
3. Electric metallic arc process shall be used for all welding. End preparations shall conform to ANSI and ASTM Standards.
4. The Contractor shall submit three copies of each welder's qualification test report to the Engineer and University Project Manager for approval prior to commencing the work. No welder shall be used on the project until so certified and approved by the University Project Manager.

C. Electrical Characteristics for Mechanical Equipment: Equipment of lower or higher electrical characteristics may be furnished provided such proposed equipment variations are specifically identified as a deviation from contract documents and approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no cost to the Owner. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support piping to prevent sagging and bending.

1.9 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for Mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for Mechanical items requiring access that are concealed behind finished surfaces.

D. Identification:

1. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
2. Coordinate installation of identifying devices with locations of access panels and doors.
3. Install identifying devices before installing acoustical ceilings and similar concealment.

E. Coordinate with all trades to maintain clearances to access panels, equipment, control and electrical panels. Intrusions into access space shall be brought to the attention of other trades. Notify Engineer of conflicts shown on drawings prior to installation.

F. Prior to fabricating work or commencing the work, Contractor shall prepare coordination drawings combining disciplines of all trades prior to installation of systems and equipment. Indicate architectural, structural, HVAC, plumbing, fire protection, electrical, and telecommunications. Drawings shall correlate with elements of all trades to predict and prevent conflicts and identify pathways and adequate space. Drawings shall identify required access to equipment and panels and shall identify zones over electrical panels and equipment to be free of ductwork and piping.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for 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, the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 Mechanical piping Sections for pipe, tube, and fitting materials and joining methods.

1. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 Mechanical piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8-inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Use dielectric couplings.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum working pressure as required to suit system pressures.

1. Available Manufacturers:

   a. Capitol Manufacturing Co.
   b. Central Plastics Company
   c. Epco Sales, Inc.
   d. Watts Industries, Inc.; Water Products Division

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Available Manufacturers:

   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Central Plastics Company
   d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150 or 300 psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225°F .

1. Available Manufacturers:

   a. Calpico, Inc.
   b. Lochinvar Corp.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Available Manufacturers:

   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
   e. PSI/Thunderline/Link-Seal

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Zinc dichloromate or glass reinforced plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.7 GROUT

A. Description: ASTM C1107, Grade B, non-shrink and non-metallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, non-corrosive, non-gaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.8 ELECTRIC MOTORS

A. General: All motors (except as noted) shall conform to the following specifications:

1. Comply with requirements in this Section except when stricter requirements are specified in Mechanical equipment schedules or sections.
2. 1/2 hp and Smaller: Single-phase.
3. Larger than 1/2 hp shall be 3-phase, except where specifically noted otherwise.
4. Comply with NEMA MG 1 unless otherwise indicated.
5. Motors shall be UL listed for intended use.

B. Motor Characteristics:

1. Duty: Continuous duty at ambient temperature of 40°C and at site elevation.
2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. Polyphase Motors:

1. Description: General purpose NEMA MG 1, Design B, except "C" where required for high starting torque, medium induction motor.
2. Efficiency: NEMA Premium Efficiency, as defined in NEMA MG 1 when available, otherwise energy efficient, as also defined therein.
3. Service Factor: 1.15.
4. Multispeed Motors: Separate winding for each speed.
5. Rotor: Random-wound, copper windings, squirrel cage.
6. Bearings:
    a. Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading, minimum 40,000 hour L10 life.
    b. Sleeve type bearings are permitted for fractional horsepower and light-duty motors.
    c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
7. Insulation: Class F.
8. Code Letter Designation:
    a. Motors 15 hp and Larger: NEMA starting Code F or Code G.
    b. Motors Smaller than 15 hp : Manufacturer's standard starting characteristic.
9. Enclosure:
    a. Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
    b. Open drip-proof motors for indoor use where satisfactorily housed and properly ventilated during operation.
    c. Weather protected Type I for outdoor use when enclosed or housed with adequate ventilation.

d. TEFC in mechanical areas of the heat plant and when exposed to weather or moist locations.
e. Special enclosures required for hazardous areas (explosion proof, etc.) per equipment schedules. Explosion-proof motors shall be UL listed.

10. Motor Selection Criteria:

a. Motor sizes shall be large enough so that the driven load will not require the motor to operate above 80% of its rated horsepower. Minimum horsepower ratings are shown or scheduled on the drawings.
b. Pump motors shall be "non-overloading"; i.e. shall not operate in service factor at any point on pump curve.

D. Additional Requirements for Special Polyphase Motors.

1. Motors Used with Reduced-Voltage and Multi-speed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
2. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

a. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
b. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
c. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
d. Shaft grounding kits, Aegis SGR, Shaft Grounding Systems, Model G JR, or approved equal.

E. Single Phase Motors:

1. Motors shall be one of the following, to suit starting torque and requirements of specific motor application:

a. Permanent-split capacitor (PSC).
b. Split phase.

2. Multispeed Motors:

a. Electronically commutated motor (ECM): Provide ECM motors with speed control when available as an option.
b. Variable-torque, permanent-split-capacitor type.

3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
4. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.9 POWER FACTOR CORRECTION

A. Capacitors shall be installed on all motor/controller combinations 25 hp and larger that have an uncorrected power factor of less than 90% at rated load. KVAR size shall be as required to correct motor power factor to 95% lagging.

B. Capacitors shall have:

1. Individual unit cells
2. All welded steel housings
3. Non-flammable synthetic liquid impregnant
4. Craft tissue insulation
5. Aluminum foil electrodes

C. Each capacitor shall be internally fused.

2.10 MOTOR CONTROLLERS

A. General Motor Controller Characteristics:

1. Single speed and multi-speed motor controllers shall be combination type, full NEMA-rated starters with fused or non-fused disconnect switch for all motors provided.
   Exception: Starters that are shown to be provided integral within packaged equipment, control panels with door mounted disconnects or in motor control centers.
2. All combination starters shall be adequately braced for the fault current available 42,000 AIC @ 480V, 3-phase and 65,000 AIC @ 208V, 3-phase shall be the minimum ratings.
3. All starters, whether separately furnished or integral with equipment, shall comply with the following:

   a. Enclosures: NEMA Type 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA Type 4 with conduit hubs, or units in hazardous locations that shall have NEC proper class and division explosion proof enclosure. Mechanical areas of the heat plant shall be considered wet locations.
   b. 3-phase Starters:

      1) All starters for 3-phase motors shall be magnetic complete with the following accessories.

         a) Three-leg electronic overload protection with 3-phase voltage monitor to provide quick-trip on single phasing, phase reversal, or high/low voltage with externally operated manual reset and visual trip indicator. Trip setting shall be adjustable with locking cover; initial trip setting shall be Class 10.
         b) Control transformers with fused primary and secondary per NEC.
         c) 120-volt holding coils.
         d) Integral Hand-Off-Auto switch for single-speed motors.
         e) Integral High-Low-Off-Auto switch for two-speed starters.
         f) High- to low-speed compelling time delay relay for two-speed starters.

g) Integral Forward-Reverse-Off-Auto switch for starters serving reversible motors.
h) Compelling time delay relay for starters serving reversible motors.
i) Auxiliary contacts, one normally open and one normally closed minimum.
j) "Run" pilot light.

2) Approved full NEMA rated starters are Allen-Bradley, Bulletin 500; General Electric, 300 Line; and Square D, Type S.

c. Single-phase Starters: Starters shall be shall be horsepower-rated thermal overload switches.

B. Refer to Section 26 29 23 for Variable Frequency Drives.

2.11 MISCELLANEOUS ELECTRICAL DEVICES

A. Furnish all necessary control devices such as speed controls, transformers, and relays as required for proper operation of all equipment furnished under this Division.

B. Furnish all remote switches and/or pushbutton stations required for manually operated equipment complete with low energy pilot lights of an approved type.

C. Enclosures: NEMA Type 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA Type 4 with conduit hubs, or units in hazardous locations that shall have NEC proper class and division explosion proof enclosure. Mechanical areas of the heat plant shall be considered wet locations.

D. Furnish circuit and purpose identification for each remote manual switch and/or pushbutton station furnished herein. Identification may be either engraved plastic sign for permanent mounting to wall below switch, or stamping on switch coverplate. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate area.

2.12 ACCESS PANELS OTHER THAN SHEET METAL

A. Access panels are to have Underwriters' Laboratories B label fire rating when installed in fire-rated walls or ceiling.

B. Access panels for installation in plaster are to be similar to Milcor style "K," all other access panels are to be similar to Milcor style "M."

2.13 IDENTIFICATION

A. Equipment Labels:

1. Plastic Labels for Equipment:

a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
b. Letter Color: White.
c. Background Color: Black or blue.
d. Maximum Temperature: Able to withstand temperatures up to 160°F.
e. Minimum Label Size: Length and width vary for required label content, but not less than 3 x 1 inch.
f. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
g. Fasteners: Stainless steel rivets or self-tapping screws.
h. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2. Equipment nameplates shall include the following minimum information:

a. Plan identification
b. Capacity specified at designed operating conditions
c. Actual capacity as balanced at site operating conditions
d. Area or zone served

3. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2" x 11" bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the specification section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

B. Pipe and Duct Identification:

1. All accessible duct and piping shall be color coded and identified with wording and arrows every 50 feet, at each riser, at each junction, at each access door, and where required to easily identify the medium transported.
2. Duct and piping systems shall be identified by:

a. Background color
b. Lettering color, and
c. Flow direction arrow

3. Duct and piping background color shall be applied to all exposed piping (either over bare pipe or the insulation) in mechanical rooms. Identifying lettering and arrows shall then be added as indicated above, and as necessary to be visible from anywhere in the room.

   a. For duct in mechanical rooms, chases, and other exposed areas, as well as piping routed in other exposed areas such as chases, background color shall be applied in a 2-foot-wide band with identifying lettering and a flow direction arrow.
   b. Background and lettering shall be semi-gloss enamel paint by DeVoe (Mirrolac), Pratt and Lambert, Glidden, Rust-Oleum, Sherwin Williams or prior approved equal. The colors specified herein shall not vary.

Color	Sherwin Williams	Pratt & Lambert	Rust-Oleum
Red	SW4081 Safety Red	1007 Vibrant Red	964 Federal Safety Red
Orange	SW4083 Safety Orange	S4507Safety Orange	956 Federal Safety Orange
Yellow	SW4084 Safety Yellow	1732 Spectrum Yellow	944 Federal Safety Yellow
Green	SW4085 Safety Green	Safety Green	933 Federal Safety Green
Blue	SW4086 Safety Blue	1228 Anchors Aweigh	925 Federal Safety Blue
Purple	SW4080 Plum	Bright Medium	Bright Medium
Silver (Aluminum)	B59S11 Silver Brite	--	--
Black	Black	Effecto Black	634 Black
White	White	Effecto White	2766 White
Brown	SW4001 Bolt Brown	2278 Char Brown	--

Note: University experience has shown that Mirrolac works well in this application, being durable with excellent coverage.

   c. Identifying lettering shall be painted or stenciled on duct or pipe over the background color. Self-adhesive or glue-on type labels are acceptable. Letters shall be 2" high for duct and larger piping 3" or more, 1" high for 1-1/4" to 2-1/2" pipe, and 1/2" high for 1" pipe and smaller.
   d. Arrows to indicate direction of flow shall be painted over the background color in the same color as the lettering. The arrow shall point away from the lettering. On duct and large piping 3" or more in diameter, the "shaft" of the arrow shall be 2" long and 1" wide. Smaller piping, 2-1/2" or less, shall have arrows with a shaft 1/2" wide and 2" long. Use a double-headed arrow if the flow can be in either direction.
   e. Piping and duct shall be identified with the following colors:

Service	Background	Identifying Lettering	Lettering
Natural Gas	Brown	NATURAL GAS	Yellow
Compressed Air	Silver	COMPRESSED AIR	Black
Instrument Air	Yellow	INSTRUMENT AIR	Black
Nitrogen	Silver	NITROGEN	Black

Service	Background	Identifying Lettering	Lettering
Boiler Blow-Off	Yellow	BLOW-OFF WATER	Black
Non Potable	Green	UNSAFE WATER	Black
Cold Water	Green	DOMESTIC COLD WATER	White
Softened Water	Green	SOFTENED WATER	Black
Chilled Water Supply	Blue	CHILLED WATER SUPPLY	White
Chilled Water Return	Blue	CHILLED WATER RETURN	White
Cooling Water Supply	Blue	COOLING WATER SUPPLY	White
Cooling Water Return	Blue	COOLING WATER RETURN	White
High Temperature Supply	Yellow**	HIGH TEMP WATER SUPPLY	Black
High Temperature Return	Yellow**	HIGH TEMP WATER RETURN	Black
System Make-Up	Green	MAKE-UP WATER	White

***Note: Directional arrows required on HTHW Piping*

C. Valve Tags:

1. Valve Schedules: For each piping system, on 8-1/2" x 11" bond paper, tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. List valve size if NPS 3 and larger. Mark valves for emergency shutoff and similar special uses.

   a. Submit valve schedule and a map or drawing of the valve tags to Engineer and Owner for approval prior to making valve tags. The flow diagram or P&ID diagram in the contract documents may be used as basis for the "map" with additional valves hand-written onto the diagrams.
   b. Valve-tag schedule shall be included in operation and maintenance data.

2. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

   a. Tag Material: Brass, 3 x 1 inch rectangular, 0.051-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   b. Fasteners: Steel ring.

3. Each valve on the drawing shall be identified separately, and valve tags shall match the drawing identification. Valve tags shall be connected to valve stems by steel rings and include the following minimum information:

   a. System or Equipment identification

      1) High Temperature Water Systems HTW-xxx
      2) Cold and Softened Water Systems DCW-xxx

3) (Process) Cooling System PCW-xxx
4) Chilled Water System CHW-xxx
5) Compressed Air System CDA-xxx

b. Normal position
c. Duty
d. Area served
e. Valve type
f. Additionally, heating water valves, steam valves, and all valves located in the secondary (low pressure) side of HTW heat exchangers shall include the manufacturer, size, grade, and pressure-temperature service rating.

PART 3 – EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 01 and Division 02 for general demolition requirements and procedures.

B. Disconnect, demolish, and remove Mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying Mechanical piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
    c. Insulated Piping: Split, cast-brass type with spring clips.
    d. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: One-piece or split, cast-brass type with polished chrome-plated finish.

2. Existing Piping: Use the following:

    a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
    b. Insulated Piping: Split, cast-brass type with spring clips.
    c. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: Split, cast-brass type with polished chrome-plated finish.

M. Sleeves through floors shall extend 2 inches above floor level for core-drilled holes and sealed to the floor to prevent water passage. Sleeves are not required for core-drilled holes through walls.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
   Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials, seismic installation may require additional clearance:

    a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
    b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions. Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using fire and smoke rated joint sealants appropriate for size, depth, and location of joint.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials listed for application.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

T. Install dielectric fittings or approved adaptor fittings on all joints between different piping materials on steam, hot water, chilled water, condenser water, steam condensate, ground source heat pump loop systems and other hydronic mechanical piping systems.

U. Old Pipe Lines: If any old sewer, water, gas, or other pipes are encountered that interfere with the proper installation of new work and that will not be used in connections with the new work, close all openings in proper manner or, if necessary, relocate or remove the pipes as shown on plans. Should any old pipes and/or electrical lines not shown on plans be encountered, immediately notify Owner's representative before taking any action.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

1. Welding:

a. All welding on piping, including tack welding, shall be performed by welders currently qualified and certified for the applicable welding process. See Part 1 of this section. A file shall be maintained for examination upon request of all qualified weld procedures and the names of the qualified welders performing this work.
b. Each welder, upon beginning the weld, will stamp his assigned welder code into the pipe. Each joint shall be performed by a single welder.
c. Examine the inside of each length of piping to make sure it is free from dirt and obstructions. If obstructed in any way, the pipe shall be swabbed out before being incorporated into the system.
d. Before and after piping fabrication, all flanges, threaded connections, and beveled pipe ends shall be protected with end protectors and suitable grease to prevent corrosion and damage until installed into the system.
e. Before welding, the end of the pipe and fittings shall be cleaned of rust, scale, dirt, grease, protective coating, or other foreign matter which might affect the quality of the welds.
f. When pipes of different wall thicknesses are to be welded together, the end of the thicker pipe shall be smoothly tapered to the wall thickness of the thinner pipe. The taper angle shall not be more than 30° from the axis of the pipe.
g. Before welding, the piping shall be aligned as required in ASME Code for Pressure Piping B31.

h. Pipe, flanges, and fittings damaged during fabrication or shipment shall be repaired or replaced, as specified by the Engineer. Any damaged section shall be removed from the job site.

i. The necessity of preheating of welds and the temperature used are a requirement of the weld procedure. If the metal temperature is below 32°F, local preheating to a temperature warm to the hand is required for materials which otherwise do not require preheating.

j. The preparation of butt welding ends of pipe, welding neck flanges, pipe fittings, and any other piping component, including valves which are butt welded into the piping system, shall be in accordance with ANSI B16.25 with the following exceptions:

    1) No permanent backing rings shall be used.
    2) Use of consumable inserts is permitted and encouraged as a means of obtaining required weld quality.

k. Spacers may be used in fitting up pipe and weld fittings for tack welding to a proper gap for full penetration welds. Small tack welds which penetrate to the bottom of the welding groove shall be used. Tack welds lacking full penetration are not acceptable and shall be removed.

l. All pipe welds that allow visual inspection on the inside and that can be reached by hand shall be inspected by the welder immediately after welding, and the following action shall be taken:

    1) Weld spatter, flux, and debris shall be removed.
    2) Excessive penetration shall be removed by grinding.
    3) Areas without penetration or fusion shall be ground to sound-metal and repair welded.

m. Cleaning of excessive flux shall be performed between welding passes using wire brushing or grinding.

n. Flanges welded to pipe spools shall be oriented with the bolt-holes straddling the centerlines established on the piping drawings. Take precautions throughout fabrication not to mar the gasket face on flanges.

o. Weld slip-on flanges on both front and back sides.

p. Thermometer wells and test wells shall be back welded.

2. Weld Examinations:

    a. Required non-destructive examinations for pipe welds are as shown in Table 136.4 of ASME B31.1, Power Piping of the ASME Code for Pressure Piping. The Contractor shall be responsible for all costs associated with required non-destructive examinations. The contractor shall perform visual examination of all welds.

        1) Visual examinations shall be performed by certified individuals as outlined in ASME B31.1, Power Piping with criteria for acceptability as noted in Part 136.
        2) The certified individual performing visual weld examinations may be an employee of the Contractor but may only examine welds performed by others.
        3) The individual(s) performing visual weld examinations shall keep an updated log of welds examined, stating acceptability, and any corrective action taken.

b. The Owner's representative will perform random non-destructive testing of work executed in addition to examinations required by ASME B31.1. The Owner shall bear the cost of radiographic examination of weld joints performed by the Contractor and the Owner's representative shall select joints to be tested. The Contractor shall repair, at no extra cost to the Owner, all welds failed under RT examinations and shall pay the cost to retest the weld. If more than 10% of the examined welds of any individual welder fail, the Contractor shall assume responsibility and costs to examine any and all welds made by that welder and selected by the Owner's representative.

c. Criteria for acceptability shall be as shown in ASME B31.1, Power Piping, Part 136. Spot or random radiographic testing shall apply to the following piping systems:

1) High-Temperature Water

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 ACCESS PANELS

A. Provide access panels where required for access to concealed Mechanical items such as dampers, valves, strainers, shock absorbers, cleanouts, control devices, and where required for equipment servicing.

3.5 IDENTIFICATION COMMON REQUIREMENTS

A. Preparation: Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

B. Equipment Label Installation:

1. Install or permanently fasten labels on each major item of Mechanical equipment.
2. Locate equipment labels where accessible and visible.

C. Pipe and Duct Label Installation:

1. Piping Color-Coding per University of Utah Standards.
2. Locate pipe and duct labels where exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

a. Near each valve and control device.
b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
c. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
d. At access doors, manholes, and similar access points that permit view of concealed piping or duct.
e. Near major equipment items and other points of origination and termination.

f. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

D. Valve Tag Installation: Install tags on valves and control devices in piping systems, except check valves. List tagged valves in a valve schedule.

1. Valve-Tag Application: Label all valves with tags indicating service and number. Securely fasten with steel ring. Match service abbreviations given on Mechanical drawings.

3.6 PAINTING

A. Painting for identification of Mechanical systems, equipment, and components is specified in Part 2.13, Identification above.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Primer and paint pipe, ductwork, and equipment located outdoors unless surfaces are galvanized. Use primer and paint rated higher than normal operating temperature of the component.

3.7 CONCRETE BASES & GROUT

A. Concrete Base:

1. Anchor equipment to concrete base according to equipment manufacturer's written instructions.
2. Construct concrete bases of dimensions indicated, but not less than 6 inches larger in both directions than supported unit.
3. 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 the base.
4. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
5. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
6. Install anchor bolts to elevations required for proper attachment to supported equipment.
7. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
8. Use 4000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03.

B. Grouting:

1. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
2. Clean surfaces that will come into contact with grout.
3. Provide forms as required for placement of grout.
4. Avoid air entrapment during placement of grout.

5. Place grout, completely filling equipment bases.
6. Place grout on concrete bases and provide smooth bearing surface for equipment.
7. Place grout around anchors.
8. Cure placed grout.

C. Provide 4 inch wide by 4 inch tall concrete curb for ducts penetrating through floors unless duct is enclosed in a chase. Anchor curb to floor at corners and at 18 inches on-center around perimeter, provide horizontal rebars around curb, roughen the existing concrete under the curb, and apply bonding agent before pouring concrete.

D. Seismic Coordination: Coordinate base with Division 23 Section "Wind, Seismic, and Vibration Controls for Mechanical Work" for additional requirements.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 for structural steel and Division 23 Section "Wind, Seismic, and Vibration Controls for Mechanical Work" for additional requirements.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.9 CLEANING

A. Cleaning and Flushing:

1. All water circulating systems for the project shall be thoroughly cleaned before placing in operation to rid the system of dirt, piping compound, mill scale, oil, and any and all other material foreign to the water being circulated.
2. Extreme care shall be exercised during construction to prevent all dirt and other foreign matter from entering the pipe or other parts of the system. Pipe stored on the project shall have the open ends capped, and equipment shall have all openings fully protected. Before erection, each piece of pipe, fitting, or valve shall be visually examined and all dirt removed.

    a. Heating Water Systems: High-temperature water heating systems, including converters, pumps, coils, and piping shall be cleaned per Section 23 25 00, Water Treatment.

3. After the system (or portion thereof) has been leak tested, thoroughly flush with clean water. During the clean water flush, all valves shall be full open, the flow rate for flush shall be at least 4 ft./sec., and the total flow shall equal at least five times the total piping system volume. Flushing shall continue until water runs clear.
4. After clear water flushing is complete, a chemical flushing solution, shall be utilized to remove oil, grease, piping compounds, etc. After the system is filled with this solution, the system shall be brought up to temperature and allowed to circulate for at least eight hours. The system shall then be drained completely and reflushed with fresh water.

5. After the system has been completely cleaned as specified herein, it shall be tested by litmus paper or other dependable method and left on the slightly alkaline side (pH = 7.5+). If the system is found to be still on the acid side, the chemical flush shall be repeated as necessary.
6. The Owner's representative shall be given notice of this cleaning operation. If the Owner's representative deems it necessary, the cleaning operation shall be repeated.
7. "Stop-Leak" compounds shall not be added to the system at any time.
8. Immediately after clear water flushing is complete, a chemical corrosion inhibitor solution, as furnished by the Division 23 Section "Water Treatment," Vendor/Contractor, shall be utilized to initially treat the system.
9. Clean exterior of piping prior to application of coatings.

B. Cleanup:

1. Clean coils and plenums.
2. Clean under, in and around equipment.
3. Clean exposed surfaces of ducts, piping, and equipment.
4. Clean equipment cabinets and enclosures.
5. Provide all new filters for equipment.

END OF SECTION 23 0500

SECTION 23 0548 – WIND, SEISMIC, AND VIBRATION CONTROLS FOR MECHANICAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this Section. Additional seismic criteria may be specified in individual sections.

B. Work of this section shall be applied to all Division 23 specifications and drawings.

1.2 SUMMARY

A. This Section includes the vibration and acoustic isolation devices, wind and seismic restraint delegated design criteria, wind and seismic system performance criteria and wind and seismic for Division 23 Mechanical systems and components. The work shall conform to the 2018 International Building Code. The requirements of this specification may exceed the requirements of these codes.

B. The work in this section includes, but is not limited to, the following:

1. Conventional and seismic vibration isolation for piping, ductwork, conduit, raceways, and equipment.
2. Seismic restraints for non-isolated equipment.
3. Wind restraints for non-isolated equipment and components.
4. Certification of seismic designs and installation supervision.
5. Certification of attachment and reinforcement of housekeeping pads.
6. All equipment requiring International Building Code compliance.
7. All inspection and test procedures for systems and components requiring International Building Code compliance
8. Systems referred to below are typical. (Equipment not listed is still included in this specification.) All Mechanical systems that are part of the building in any way are referred to as systems or components and must comply with this specification, including:

Curbs	Pipe
Ductwork and Accessories	Pumps (all types)
Equipment Supports	Risers
Hangers and Supports	Temperature Controls
Fans (all types)	Variable Frequency Drives
Flues and Breeching	Vibration Isolators
Boilers	

1.3 DEFINITIONS

A. Essential Facilities: Buildings and other structures classified as Occupancy Category IV that are intended to remain operational in the event of extreme environmental loading from earthquakes.

B. Hazardous Materials: Those chemicals that are physical hazards or health hazards as defined in International Building Code, Section 307, the International Fire Code, and 29 CFR 1910.1200, Appendix A, whether the materials are in usable or waste condition.

C. Highly Toxic Materials: A material which produces a lethal dose or lethal concentration that falls within any of the highly toxic materials categories defined in the International Building Code, Section 307.1 and 29 CFR 1910.1200, Appendix A.

D. Life Safety: All systems involved with, but not limited to, fire protection including sprinkler piping, jockey pumps, fire pumps, control panels, service water supply piping, water tanks, fire dampers, smoke exhaust systems, communications and fire alarm panels intended for the prevention of loss of life.

E. Licensed Professional Engineer: The individual(s) providing delegated design shall be licensed by the state in which the project is to be constructed to practice engineering within that state.

1.4 GENERAL DESIGN AND PERFORMANCE REQUIREMENTS

A. Design Parameters:

1. Seismic Design Criteria:

a. Seismic Design Parameters:

1) Risk Category: III
2) Site Class: C
3) Mapped Spectral Response Acceleration at Short Period (S_S): 1.307
4) Design Spectral Response Acceleration at Short Period (S_{DS}): 1.045
5) Mapped Spectral Response Acceleration at 1-Second Period (S_1): 0.484
6) Design Spectral Response Acceleration at 1-Second Period (S_{D1}): 0.484
7) Seismic Design Category: D.

b. Designated Seismic Systems: The following Division 23 systems are Designated Seismic Systems as defined by Chapter 17 of the International Building Code and have a Component Importance Factor of 1.5. Refer to other Divisions for designation of respective systems. The systems and components shall remain in-place, structurally intact, and operational after a design seismic event. Certificates of compliance are required for all designated seismic systems.

1) Life Safety:

a) Fire dampers, smoke dampers and combination fire smoke dampers
b) Smoke management systems

2) Systems Containing Hazardous Materials or Highly Toxic Materials:

a) Fuel oil systems
b) Fuel gas piping systems

3) Essential Systems:

a) All systems in entire building.
b) Mechanical systems serving entire building

2. Wind Design Criteria:

a. Design wind speed (3-second gust): 109 mph
b. Wind Importance Factor *(Iw)*: 1.0
c. Exposure Category: C

B. General Design and Performance Requirements:

1. All equipment, piping, and ductwork, conduit, and raceways shall be seismically braced or restrained and shall comply with the 2018 International Building Code, Section 1613, Earthquake Loads. Reference herein to the requirements of the International Building Code shall include the requirements of ASCE 7-10, Chapter 13, where incorporated by reference in the International Building Code. Where seismic restraint is required, vibration control shall apply as specified.
2. All outdoor equipment, including roof mounted components shall comply with the International Building Code, Section 1609, Wind Loads. Reference herein to the requirements of the International Building Code shall include the requirements of ASCE 7-10, Chapters 6, where incorporated by reference in the International Building Code.
3. Wind and seismic bracing and isolation materials in one specification division shall be the products of the same manufacturing group where available and shall be certified by that group or an independent testing agency approved by the Authority Having Jurisdiction.
4. All Mechanical building system components shall remain in place during wind and seismic events and additionally shall remain operational where specified.
5. Wind and Seismic Load Certification and Analysis:

a. Calculations by the qualified licensed professional engineer substantiating the mounting system, wind and seismic restraints and recommended anchor bolts shall be submitted with the shop drawings as a part of the required submittals. Wind and seismic loads shall have their calculations based on criteria as established in this specification. All analysis shall be stamped by a licensed professional engineer.
b. Restraints shall maintain equipment, piping, conduit and ductwork in a captive position. Mechanical restraint devices shall be designed and selected to meet wind and seismic requirements as defined in the International Building Code, Chapters 16 and 17.

c. For projects that contain life safety, high hazard, and essential Mechanical components, provide certification of compliance and submit special inspections reports as required by the International Building Code.

Where compliance is not possible, each contractor shall submit a report (Example Form 1, "Seismic Qualification of Mechanical Components" at end of this specification) to the Authorities Having Jurisdiction and as a required submittal clearly indicating that none of the specified, listed, or other suppliers' equipment known to the Contractor meet the compliance, testing and certification portions of the International Building Code, Section 16 and 17. Special inspections of the equipment installation shall still be conducted.

d. All equipment (components) shall be secured to the structure in accordance with the code. All component manufacturers will submit shop drawings that include the following:

1) The manufacturer of all Mechanical life safety equipment, high hazard equipment, and essential equipment shall submit the Certificate of Compliance. Where components not defined as Designated Seismic Systems could affect the performance of other Designated Seismic Systems should they dislodge or fail, anchorage of that component shall require compliance.

a) Essential components include all components needed for continued operation of the facility. These components shall be certified that the mounting system will remain intact, the component shall remain structurally intact and the component shall remain operable following a design seismic event.

b) Components containing hazardous or flammable materials shall be certified that the component will maintain containment following a design seismic event.

e. For all components requiring anchorage compliance only, the licensed professional engineer shall submit a calculation package stamped by the engineer demonstrating that their project specific equipment will accept anchorage through the component's load path to structure at its center of gravity at the designated anchorage locations.

6. Wind and Seismic Anchorage:

a. Analysis for anchorage must indicate calculated dead loads, wind and seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bold diameter, embedment and/or welded length. All wind and seismic restraint devices shall be designed to accept, without failure, the forces detailed in this section, acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

b. In the event that the equipment is internally isolated and restrained, the entire unit assembly must be attached to the structure to withstand wind and seismic loads. Curb or roof rail mounted equipment must not only have wind and seismic attachment of the equipment to the roof but also to the curb or rails. The attachment and certification thereof shall be by this section. Sheet metal screw attachment is acceptable provided that the following three conditions are met and verified.

1) Calculations support sufficient quantity and size of sheet metal screws to handle all loads including shear.
2) Space or gap between the inside overhang of the rooftop unit and the curb at each of the screw locations is closed with structural material, tapered to contour to both the curb and the components' inside edge structure. Life Safety, High Hazard, and Occupancy Category IV Components.
3) The method of attachment does not violate the NRCA rating of the curb by violating the roof's member waterproofing.

1.5 SUBMITTALS

A. Delegated-Design Submittal: Vibration isolation, wind, and seismic-restraint details shall comply with performance requirements and design criteria. Analysis data shall be signed and sealed by the qualified licensed professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, wind and seismic forces required to select vibration isolators, wind and seismic restraints, and for designing vibration isolation bases.
2. Wind and Seismic-Restraint Details:

a. Design Analysis: To support selection and arrangement of wind and seismic restraints. Include calculations of combined tensile and shear loads.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacing. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during wind and seismic events. Indicate association with vibration isolation devices.
c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations) shall be submitted.

3. Architect/Engineer Responsibilities: The Architect/Engineer shall review delegated design submittals for compliance with specification requirements. Design and analysis performed by the Engineer-in-Responsible Charge of the delegated design submittal will not be reviewed.

B. Product Data:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

C. Schedules:

1. Detailed schedules of flexibly and rigidly mounted equipment for wind and seismic and components, showing vibration isolators and restraints by referencing numbered descriptive drawings.
2. Those systems and components identified as Designated Seismic Systems requiring special inspection with frequency of inspection.

D. Shop Drawings:

1. Fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
2. Details of suspension and support for ceiling hung equipment.
3. Attachment methods for ducts, pipe, conduits and raceways to floors, slabs or supplementary steel work. Restraint manufacturer's submittals must include spacing, and maximum static loads and wind and seismic loads at all attachment and support points.
4. Specific details of restraints and anchors; include number, size and locations for each piece of equipment.

E. Quality Assurance/Control Submittals:

1. Calculations shall be submitted for all restraints and anchorages.
2. "Seismic Qualification of Mechanical Components" (Example Form 1 located at end of section).
3. "Statement of Contractor Responsibility for Designated Seismic Systems and Mechanical Components Requiring Special Inspection" (Example Form 2 located at end of section).
4. "Quality Assurance Plan for Seismic Resistance" (Example Form 3 located at end of section).

F. Certificates:

1. A seismic design Errors and Omissions insurance certificate must accompany the seismic restraint equipment manufacturer's certification. Product liability insurance certificates must also be provided for all products supplied by the isolation and seismic restraint vendor.
2. Certificates of Compliance for all Designated Seismic Systems.

G. Welding: Procedures and welder certificates

1.6 QUALITY ASSURANCE

A. Quality Assurance Plan:

1. A quality assurance plan for seismic requirements shall be provided in accordance with the International Building Code, Section 1705.3 for the following:

   a. Designated seismic systems.

b. The following additional systems:

1) Heating, ventilating and air-conditioning (HVAC) ductwork containing hazardous materials and anchorage of such ductwork.
2) Piping systems and Mechanical units containing flammable, combustible or highly toxic materials.

B. Contractor Responsibilities and Approvals: Each contractor responsible for the installation of seismic components requiring special inspection shall be responsible for submitting a written contractor's Statement of Responsibility to the Authority Having Jurisdiction and the Architect/ Engineer. (Refer to Example Form 2, "Statement of Contractor Responsibility for Designated Seismic Systems and Mechanical Components Requiring Special Inspection" at end of specification.)

C. Periodic and Component Special Inspection

1. The following systems shall require Periodic Special Inspection or Component Periodic Special Inspection for seismic installation and anchorage during the course of construction.

a. Periodic special inspections during installation of piping systems intended to carry flammable, combustible or highly toxic contents and their associated Mechanical units.
b. Periodic special inspections during the installation of HVAC ductwork that will contain hazardous materials.
c. Special inspection for the installation of the following components, where the component has a Component Importance Factor of 1.0 or 1.5 in accordance with Section 9.6.1.5 of ASCE 7, shall maintain an approved quality control program. Evidence of the quality control program shall be permanently identified on each piece of equipment by a label.

1) Equipment using combustible energy sources.
2) Electrical motors, transformers, switchgear unit substations and motor control centers.
3) Reciprocating and rotating-type machinery.
4) Piping distribution systems 3 inches and larger.
5) Tanks, heat exchangers and pressure vessels.

d. Periodic special inspection is required during the installation of vibration isolation systems where the construction documents require a nominal clearance of 1/4 inch or less between the equipment support frame and restraint.
e. Seismic systems requiring seismic qualification in accordance with Section 1705.12.6 and verify that the label, anchorage or mounting conforms to the certificate of compliance.

2. The Engineer in Responsible Charge of the Delegated Design of each of the components and systems shall prepare a "Statement of Special Inspections" (refer to example form 3 at end of specification) per 2018 International Building Code Section 1705 and submit to the Authorities Having Jurisdiction and Architect/Engineer.

D. Manufacturer of restrained vibration isolation, wind, and seismic load control equipment shall have the following responsibilities:

1. Determine vibration isolation and restraint sizes and locations.
2. Provide vibration isolation and restraints.
3. Provide calculations and materials if required for restraint of non-isolated equipment.
4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.

E. All equipment of a particular category, i.e. seismic restraints, vibration isolators, flexible connectors, shall be of the same manufacturer and shall be selected using published or certified data.

F. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel" for all non-ASME Code welding.

PART 2 – PRODUCTS

2.1 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kinetics Noise Control
2. Mason Industries
3. Vibration Mounting Systems (VMC, Amber/Booth Company, and Korfund Dynamics

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to Authorities Having Jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Snubbers: All-directional seismic snubbers shall consist of interlocking steel members restrained by an elastomeric bushing of Durulene(TM) Bushing shall be replaceable and a minimum of 1/4 inch thick.

1. Rated loading shall not exceed 1000 psi. A minimum air gap of 1/8 inch shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances.
2. Elastomeric bushings shall be rotated to insure no short circuits exist before systems are activated.
3. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in and stud-wedge or female-wedge type.

D. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

E. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

F. Rigid Braces: Seismic rigid braces shall consist of ASTM A-36 steel angles or channels to resist seismic loads. Seismic solid brace end connectors shall be steel assemblies that swivel to the final attachment angle and utilize two through bolts to provide proper attachment, spaced to IBC standards for attachment to concrete or steel.

G. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.

H. Bushings for Floor-mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

I. Bushing Assemblies for Wall-mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.

J. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

K. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for dry interior applications and stainless steel for exterior and wet interior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

L. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for dry interior applications and stainless steel for exterior and wet interior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and wind and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

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

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on installation Shop Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL WIND AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install seismic snubbers on Mechanical equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an agency acceptable to Authorities Having Jurisdiction and in accordance with delegated design submittals.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127 and NFPA 13.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between mounting holes and anchor bolts in concrete base.

F. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

G. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members as approved by structural engineer.

H. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for dry interior and stainless-steel anchors for exterior and wet interior applications.

3.4 FIELD QUALITY CONTROL

A. Inspections:

1. Measure isolator restraint clearance.
2. Measure isolator deflection.
3. Verify snubber minimum clearances.
4. Engage the services of a Special Inspector qualified under Chapter 17 of the International Building Code to perform the special inspections related to seismic and wind as required in Chapter 17 of the IBC for mechanical systems.

B. Adjusting:

1. Adjust isolators after piping system is at operating weight.
2. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
3. Adjust active height of spring isolators.
4. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 23 0548

This page intentionally left blank.

FORM 1
SEISMIC QUALIFICATION OF MECHANICAL COMPONENTS

CONTRACTOR NAME: _____

DATE: _____

PROJECT: _____

The Mechanical designated seismic systems requiring certification per 2018 International Building Code Section 1705 and/or ASCE 7-10, Section 13.2.2 are listed below. The items listed as not certified are not compliant and no equivalent product is available to the best of the Contractor's knowledge.

Specification Section	Equipment Item	Service*	Certified

* Enter LS for life safety service, HZ for hazardous service, or ES for essential service

Signature:_____

Date:_____

This page intentionally left blank.

FORM 2
STATEMENT OF CONTRACTOR RESPONSIBILITY
FOR DESIGNATED SEISMIC SYSTEMS AND
MECHANICAL COMPONENTS REQUIRING SPECIAL INSPECTION

CONTRACTOR NAME: _____

DATE: _____

PROJECT: _____

SPECIFICATION SECTIONS: _____

Attached is our Statement of Responsibility containing the following information required by the 2018 International Building Code, Section 1706.

1. Acknowledgment of awareness of the special requirements contained in the statement of special inspections;

2. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official;

3. Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of the reports; and

4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

Signature:_____

Date:_____

This page intentionally left blank.

FORM 3
STATEMENT OF SPECIAL INSPECTIONS

LICENSED PROFESSIONAL ENGINEER: _____

DATE: _____

PROJECT: _____

The quality assurance plan below lists the designated seismic systems or other qualifying HVAC systems stated in the 2018 International Building Code section 1705 requiring special inspections.

SEISMIC SYSTEM	REQUIRED VERIFICATION AND INSPECTION	FREQUENCY OF SPECIAL INSPECTION	FREQUENCY AND DISTRIBUTION OF SPECIAL INSPECTION REPORTS	APPLICABLE REFERENCE STANDARDS

_____
Signature

Seal

This page intentionally left blank.

SECTION 23 0800 - COMMISSIONING OF MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications, apply to this section.

B. The OPR and BOD documentation are included by reference for information only.

1.2 SUMMARY

A. This section includes commissioning process requirements for Mechanical systems, assemblies, and equipment.

B. Related Sections: Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.3 DESCRIPTION

A. Refer to Division 01 Section “General Commissioning Requirements” for the description of commissioning.

1.4 DEFINITIONS

A. Refer to Division 01 Section “General Commissioning Requirements” for definitions.

1.5 SUBMITTALS

A. Refer to Division 01 Section “General Commissioning Requirements” for CxA’s role.

B. Refer to Division 01 Section “Submittals” for specific requirements. In addition, provide the following:

C. Certificates of readiness

D. Certificates of completion of installation, prestart, and startup activities.

E. O&M manuals

F. Test reports

1.6 QUALITY ASSURANCE

A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standards testing equipment for the Mechanical system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities. A sufficient quantity of two-way radios shall be provided by each subcontractor.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems

B. Red-lined Drawings: The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings. The contracted party, as defined in the Contract Documents will create the as-built drawings.

C. Operation and Maintenance Data: Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

D. Demonstration and Training: Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session

3.2 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meetings.

C. Attend testing, adjusting, and balancing review and coordination meetings.

D. Participate in Mechanical systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.

G. Prepare preliminary schedule for Mechanical system orientations and inspections, operation and maintenance manual submissions, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for owner. Distribute preliminary schedule to commissioning team members.

H. Update schedule as required throughout the construction period.

I. Assist the CxA in all verification and functional performance tests.

J. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

K. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA 45 days after submittal acceptance.

L. Coordinate with the CxA to provide five (5) days advance notice so that the witnessing of equipment and system start-up and testing can begin.

M. Notify the CxA a minimum of two (2) weeks in advance of the time for start of the testing and balancing work. Attend the initial testing and balancing meeting for review of the official testing and balancing procedures.

N. Participate in, and schedule vendors and contractors to participate in the training sessions.

O. Provide written notification to the CM/GC and CxA Authority that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

1. Mechanical equipment including all fans, air handling units, ductwork, dampers, terminals, and all other equipment furnished under this Division.
2. Fire stopping in the fire rated construction, including fire and smoke damper installation, caulking, gasketing and sealing of smoke barriers.
3. Fire detection and smoke detection devices furnished under other divisions of the specification.
4. Building Automation System/ Control System
5. HTHW Generator
6. Stack Economizer
7. Piping, Valves, Tanks, etc.

P. The equipment supplier shall document the performance of his equipment.

Q. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.

R. Test, Adjust and Balance Contractor

1. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.
2. Submit the site specific testing and balancing plan to the CxA and AE for review and acceptance.
3. Attend the testing and balancing review meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in testing, adjusting, and balancing the Mechanical system.
4. At the completion of the testing and balancing work, and the submittal of the final testing and balancing report, notify the Mechanical contractor and the CM/GC.
5. At the completion of testing and balancing work, and the submittal of the final testing and balancing report, notify the Mechanical Contractor and the CM/GC.

6. Participate in verification of the testing and balancing report, which will consist of repeating measurements contained in the testing and balancing reports. Assist in diagnostic purposes when directed.

S. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
2. Assist in equipment testing per agreements with contractors.
3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

T. Refer to Division 01 Section “General Commissioning Requirements” for additional contractor responsibilities.

3.3 OWNER’S RESPONSIBILITIES

A. Refer to Division 01 Section “General Commissioning Requirements” for Owner’s Responsibilities.

3.4 DESIGN PROFESSIONAL'S RESPONSIBILITIES

A. Refer to Division 01 Section “General Commissioning Requirements” for Design Professional’s Responsibilities.

3.5 CxA'S RESPONSIBILITIES

A. Refer to Division 01 Section “General Commissioning Requirements” for CxA’s Responsibilities.

3.6 TESTING PREPARATION

A. Certify in writing to the CxA that Mechanical systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that Mechanical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify in writing that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.7 TESTING, ADJUSTING AND BALANCING VERIFICATION

A. Prior to performance of Testing, Adjusting and Balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least ten (10) days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of Mechanical systems at the direction of the CxA.

1. The CxA will notify testing and balancing subcontractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.8 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Mechanical testing shall include entire Mechanical installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the Mechanical contractor, testing and balancing Subcontractor, and Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for Mechanical systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the Mechanical system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.9 MECHANICAL SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 23 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. &R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections "Instrumentation and Control for Mechanical" and "Sequence of Operations for Mechanical Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment: Test requirements are specified in Division 23 piping Sections. Mechanical Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. Mechanical Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including Mechanical terminal equipment and unitary equipment.

F. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

G. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:

1. Building Automation System
2. HTHW Generator
3. Chemical Treatment
4. Ductwork
5. Pumps
6. Piping
7. Testing, Adjusting and Balancing
8. Stack Economizer coil

3.10 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.11 APPROVAL

A. Refer to Division 01 Section “General Commissioning Requirements” for approval procedures.

3.12 DEFERRED TESTING

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deferred testing.

3.13 OPERATION AND MAINTENANCE MANUALS

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.

B. Refer to Division 01 Section “General Commissioning Requirements” for the AE and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.14 TRAINING OF OWNER PERSONNEL

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to training.

END OF SECTION 23 0800

This page intentionally left blank.

SECTION 23 0913 – INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Sections:

1. Division 01, Section "General Commissioning Requirements" for responsibilities and procedures of the Commissioning Agent.
2. Division 23, equipment and system sections with specific control requirements.
3. Division 26, sections for electrical equipment and wiring and conduit requirements and any electrical interface to the controls and instrumentation.

C. Products Supplied, But Not Installed Under This Section:

1. Controls Contractor shall provide all automatic temperature control dampers which are not part of packaged equipment, for installation by the Mechanical Contractor under the Control Contractor's supervision.
2. The Controls Contractor shall make all necessary connections (pneumatic and electrical) to the control system.

1.2 SYSTEM DESCRIPTION

A. Design Requirements:

1. Coordination: This Contractor shall interface with controls furnished with equipment. Provide additional control devices, interlock relays, and signal conditioners and gateways/routers when necessary to accomplish specified sequences and interoperability.
2. Electrical wiring in connection with the automatic temperature control system, where shown on the Division 26 drawings, shall be performed by the Electrical Contractor. All other wiring required for proper operation of the automatic temperature system shall be performed by this Contractor.
3. Adjustments of manual balancing devices, as required to obtain design air and/or water flows shall be by the Balancing Contractor. Controls Contractor shall provide assistance to Balancing Contractor with control adjustments as required to obtain design flows by:

    a. Providing on-site instruction on the proper interfacing and operation of their equipment.
    b. Providing the necessary software for use with Balancing Contractor's personal computer for interfacing with their control equipment. Where proprietary software, equipment or gateways are required, this equipment shall be provided for Balancing Contractor's use.

4. Commissioning of building systems shall be by the Commissioning Agent. This Contractor shall be responsible for startup, checkout, and debugging of all equipment installed and/or modified under this section. The Controls Contractor shall fully participate in the commissioning process and assist the Commissioning Agent with control demonstration and software adjustments, required for proper operation. This Contractor shall cooperate with the Commissioning Agent as to startup procedures, scheduling, performance verification, and system debugging. The Controls Contractor shall:

    a. Provide on-site instruction on the proper interfacing and operation of their equipment and provide a printout of all software code and all user interface screens.
    b. Provide the necessary software for use with the Commissioner's personal computer for interfacing with the control equipment. Where proprietary software, equipment or gateways are required, it shall be provided for the Commissioning Agent's use.
    c. Provide any portable hand held setup/calibration devices required to initialize the control system for the Commissioning Agent's use.
    d. Provide personnel to demonstrate the operation of the hardware and software during the commissioning process.

B. DDC Requirements: DDC Controllers shall utilize peer-to-peer communications. Each DDC controller shall operate independently by performing its own specified control, alarm management, operator I/O, and data collection. The failure of any single component or network connection shall not disrupt the execution of control sequences at other operational devices.

1.3 SUBSTITUTION APPROVALS

A. Where no specific manufacturer is listed, a first-class item of cataloged manufacture shall be furnished.

B. Prior Approvals: Refer to Division 01 Section "Product Substitution Procedures."

C. Substitution Requests after Execution of Contract: If Contractor wishes to furnish or use a substitute item of material and/or equipment; he must submit a change order request to the Architect/Engineer. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number and/or drawing number. A price change (increase or decrease) shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight and other applicable data. The change order request will be reviewed for equality, suitability and reasonableness of price differential. A single substitution change order listing the approved items will be issued with the net cost of the change order being the sum of the approved item costs. No subsequent substitution change orders will be considered. The Engineer's decision will be final.

D. It shall be the responsibility of the Contractor to assure that the substitute material and/or equipment fits into the space provided and the Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions.

1.4 SUBMITTALS

A. Schedule: Submittal data and control drawings for all equipment and systems shall be submitted to the Architect/Engineer for review prior to ordering or fabrication of the equipment. The following information shall be included in these submittals:

1. 30 Days or Less After Notice to Proceed:

   a. Damper schedules.
   b. The damper schedules shall also be submitted to the mechanical contractor for review by the piping and sheet metal contractors.
   c. Product data including all products used in conjunction with the control system.

2. 60 Days or Less After Notice to Proceed:

   a. Control drawings
   b. Software information
   c. Test Plan and procedures

B. Shop Drawings:

1. General:

   a. Drawings shall be prepared using computer aided drafting which can produce files compatible with AutoCAD 2007 or later.
   b. Product data shall be in a 3-ring binder. All product information shall be indexed and tabbed. The product data sheets shall be marked with the tag number as indicated by the drawings. All options, ranges, and voltages that are to be provided shall be clearly indicated on each product data sheet.

2. Damper Schedules:

   a. Damper schedules may be included on the drawings or in the product data. The damper schedule shall include the following information:

      1) Damper tag number
      2) System and service
      3) Quantity
      4) Size
      5) Manufacturer and model number
      6) Fail position
      7) Type (opposed, parallel)
      8) Actual pressure drop
      9) Quantity of actuators
      10) Actuator model number
      11) Actuator spring range

3. Drawings: The drawing package shall include:

   a. Cover sheet with a drawing index listing all included drawings.

b. Control schematics and flow diagrams for each system monitored or controlled. These diagrams shall include:

1) A ladder diagram showing all wiring and pneumatic tubing associated with the controller. The location of the electrical power panel with breaker number shall be shown for all power sources.
2) Details showing the interconnection with motor starters, variable frequency drives and the associated bypass sections, chillers, boilers and other types of equipment. These details shall include wire numbers terminal designations and protocol and physical media (wire type). The mounting locations of all control equipment shall be included.
3) A bill of materials shall be included with each control schematic. The bill of materials shall include the tag name used on the control drawing, description of the product, name of the manufacturer, complete model number, measurement range (if applicable) and quantity.
4) A complete input/output schedule for each DDC controller shall be included with each control schematic. The point name (the same one used in the software), and a functional description of the point shall be included in the I/O summary.
5) A sequence of operation shall be included with each control schematic. The sequence shall reflect actual programming, including all time delays and software interlocks. Copies of the sequence that appear in this specification are not acceptable.
6) Floor and roof plans showing the location of control panels, sensor, network devices, and mechanical equipment. The floor plans shall show the location of duct and space static pressure sample points.

C. Software: Software submittal shall include the following:

1. Point listings shall include all hardware and software points. Object lists for network interoperation with other equipment including VFDs and chillers. A description of the point shall be provided.
2. Program listings for each piece of controlled equipment. The program listing shall be complete with all data required for controller operation.
3. Color printout of each graphic. The graphic shall show temperature, status, position and all data points that will appear on the screen. Optionally, the graphics may be submitted on CD or disk provided that all required software for the display of the graphics is also furnished.
4. A listing of all alarms and the alarm limits and time delays.

D. Seismic Control Data: Submit all required information by the Delegated Design Professional in responsible charge of design for Seismic Controls for this project. Where specification Section 23 05 48 “Wind, Seismic, and Vibration Controls for Mechanical Systems” does not indicate any required seismic controls, no such submittal is required.

E. Wind Resistance Data: For all systems and equipment installed outdoors, submit shop drawings indicating the design of the supports and curbs, the attachments to supports and curbs, and the attachment of the support and curbs to the structure, slab, or grade as required to provide resistance to the wind forces identified in specification section 23 05 48 “Wind, Seismic, and Vibration Controls for Mechanical Systems”. Where there is no product of this section installed outdoors, no such submittal is required.

F. Quality Assurance/Control Submittals:

1. Test Plan and Procedures: The test plan shall include the following:

   a. Certification documentation for each hardware point. Certify that the point was verified, tested and cycled to prove functionality. Include the calibration data, initial and final readings and the required offset.
   b. Test data form for testing pneumatic tubing.
   c. Procedures for the 7-day test.
   d. Certification documentation for software sequence of operation.

G. Close-out Submittals - Project Record Documents:

1. Upon completion of the installation, provide a complete set of record (as-built) drawings. The content and format of the drawings shall be as described previously.
2. Prior to final completion of the installation, prepare complete Operation and Maintenance (O&M) manuals. Refer to Division 01, Section "Submittal Procedures" for requirements. Also provide one CD ROM containing all CAD-prepared drawing files compatible with AutoCAD 2007 or later.
3. The temperature control diagrams shall be laminated and secured to the panel.
4. Control System Programmer's manual with complete description of the custom control language and associated editor, including sample-written programs. Provide complete sets of all programming forms, applications memorandums, and addenda to the programmer's manual. All software and firmware algorithms shall be completely described and documented.
5. Maintenance, installation, and engineering manual(s) that clearly explain how to debug hardware problems; how to repair or replace hardware; preventative maintenance guidelines and schedules; calibration procedures; and how to engineer and install new points, panels, and operator interfaces.
6. Documentation of all software: List separately all software parameters that may need updating by the Owner, such as, though not limited to, daily start/stop schedules; set points; alarm points; control loop cascade, and PID parameters, etc.
7. All programs, code, databases, graphic files, CAD drawings, and symbol libraries generated for operation of the system shall be included as part of the system documentation. This information shall be submitted both in hard copy bound format on CD-ROM.
8. Complete original issue documentation, installation, operation manuals, and supporting software for all third-party hardware and software furnished and installed as part of the system or required for the operation of the system, including remote terminals, user's computer workstation, monitors, graphics and memory boards, network servers, printers, and modems.
9. All software licenses, warranty certificates and documentation for all hardware and software including third-party hardware and software shall be provided.
10. All testing, startup, calibration, and check-out reports and checklists.
11. A list of recommended spare parts with part numbers and supplier.
12. Recommended preventive maintenance procedures for all system components including a schedule of tasks (inspection, cleaning, calibration, etc.), time between tasks, and task descriptions.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Approved Controls Manufacturers and Installing Contractors:

Controls Manufacturer	Installing Contractors
Johnson Controls Inc.	Local Field Office

2. Manufacturers not listed in item 1 above may request approval by submitting a proposal at least 15 days prior to bid date. The proposal shall include the information listed below.

   a. A listing of all personnel that will be assigned to this project, their position, and a resume of experience.
   b. An analysis of compliance to this specification. Indicate for each paragraph compliance or exception. If the product or service does not completely match the requirements, indicate exception and describe fully the area(s) of deviation and their impact on system functionality. This analysis shall be presented in the opposing page format. The specification shall be presented on one page with the compliance or exception described on the opposing page.
   c. A sample of the as-built documentation for a project of similar magnitude. This sample shall include items specified in this specification insofar as possible.
   d. A list of references with project descriptions for five local installations of similar scope and magnitude. Include contact names and phone numbers for an operating engineer, facility manager and the consulting engineer for each reference.

B. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's representative in writing. This requirement is not intended to restrict the Contractor to the use of outdated equipment.

C. All products used in this installation shall be new and currently under manufacture. Spare parts shall be available for at least five years after completion of this contract.

D. All work, materials and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:

1. International Building Code (IBC)
2. International Mechanical Code (IMC)
3. American Society of Mechanical Engineers Controls and Safety Devices for Automatically Fired Boilers)
4. International Fire Code (IFC)
5. National Electric Code (NEC)
6. Occupational Safety and Health Act (OSHA)
7. Applicable state and local codes

1.6 WARRANTY

A. Refer to the General Conditions of the Contract and Division 01 for general warranty requirements and duration.

B. Special Warranty:

1. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace products that fail in materials or workmanship within specified warranty period.

    a. Failures shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner.
    b. Warranty for normal non-emergency service shall occur during normal business hours and commence within 24 hours of Owner's warranty service request. The response time to critical problems shall be 4 hours maximum.
    c. Warranty Period: 1 year(s) from date of Substantial Completion.

2. The warranty period shall begin as authorized by the Owner's representative in writing. Completion shall not occur before the Contractor has performed the tests required in Article 3.
3. Contractor shall receive calls during the warranty period for all problems or questions experienced in the operation of the installed equipment and shall take steps to correct any deficiencies that may exist.
4. Contractor shall maintain a backup of all software installed in the system. A backup shall be made whenever the contractor makes a change to the software.
5. Contractor shall furnish and install all hardware, firmware, and software updates to operator workstations and controllers or webserver software, project-specific software, graphic software, database software, and firmware that resolve identified software deficiencies at no charge during warranty period. Do not install updates or upgrades without Owner's written authorization. If available, Owner can purchase an in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items.

1.7 OWNERSHIP OF PROPRIETARY MATERIAL

A. All project-developed software and documentation shall become the property of the Owner. The Owner shall retain the right to duplicate and/or modify such for use at this facility. These documents shall not be copyrighted. These include but are not limited to:

1. Project graphic images
2. Record drawings
3. Project database
4. Job-specific application programming code
5. All project specific documentation

1.8 START-UP AND TROUBLESHOOTING

A. This Contractor is responsible for the calibration, start-up, and trouble shooting of the control system. This includes programming modifications to the control sequences to account for

unanticipated operating issues, seasonal recommisioning, and any system performance issues that are identified during the warranty period. This contractor shall provide detailed 48-hour trend data (graphs) at the request of the engineer to assist in problem identification.

1. The intent of this specification is to provide the Owner with a fully operational system. Sequence of operation changes may be required during startup and warranty period as noted above. Contractor shall provide support, modify and adjust sequences and devices as required to provide a system which maintains space conditions with optimum efficiency. Tuning is an iterative process, control loops shall be tuned for proper response in all operating conditions and seasons.
2. Contractor shall make the required modifications at no additional cost.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Object Command: The maximum time between the command of a binary object by the operator and the reaction by the device shall be less than two seconds. Analog objects should start to adjust within 2 seconds.

2.2 CONTROL WIRING

A. Cables shall be shielded when so recommended by manufacturer. Conductor size shall be in accordance with manufacturer's recommendations subject to specified minimum size. See Part 3 for allowable types.

B. All low-voltage cables in plenums, not in raceway, shall be UL listed for air plenum service.

C. All insulated wire to be copper conductors, UL labeled for 90°C minimum service.

D. Raceway for wiring shall be per Division 26.

2.3 TRANSIENT VOLTAGE PROTECTION

A. TVSS surge protectors, for incoming 120V AC power to controllers: Leviton 51020WM, or Engineer-approved equal. Surge protectors furnished shall be UL 1449 listed. The maximum single-pulse transient current shall be 26kA, noise rejection at 50 ohms -40 to -50 for 5K to 100mhz, the cat B3 combination wave peak clamping voltage shall be L-N 300 V, L-G 350 V, the UL 1499 ratings shall be L-N330V, L-G 400V, Fault current rating (AIC rating assigned per UL) shall be 5000A.

1. Transient voltage protection for all twisted pair, telephone and coaxial data communication lines between controllers shall be per manufacturer recommendations. Provide all required repeaters to ensure signal integrity.
2. Lightning arrestors on all communications and other lines that exit the building shall be per manufacturer recommendations.

2.4 CONTROL DAMPERS

A. Motorized control dampers, unless otherwise specified elsewhere, shall be as follows:

1. Control dampers shall be parallel or opposed blade type as below or as scheduled on drawings.

    a. Outdoor and/or return air mixing dampers and face and bypass (F&BP) dampers shall be parallel blade.
    b. Other modulating dampers shall be opposed blade type.
    c. Two-position shutoff dampers may be parallel or opposed blade.

2. Damper frames shall be built to the structural equivalent of 13-gauge steel channel and shall be galvanized or extruded aluminum with reinforced corner bracing or welded corners.
3. Damper blades shall not exceed 8 inches (203mm) in width or 48 inches (1.2m) in length. Blades are to be suitable for medium velocity performance (2000 fpm) (10.2m/s). Blades shall be not less than 16 gauge.
4. Damper shaft bearings shall be oil impregnated bronze or stainless steel. Thrust bearings, and other special construction as required, shall be provided when dampers are to be used in blade-vertical position.
5. All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber, neoprene, or PVC-coated polyester fabric seals. Side seals shall be spring loaded stainless steel.
6. Damper Leakage: Comply with requirements in AMCA 500-D. Leakage shall not exceed 10.7 cfm per sq. ft. (33 L/s per sq. m) at a static-pressure differential of 4.0 inches water column (1000 Pa) when a torque of 5 inch pounds per sq. ft. (30.1 Newton meters per sq. m) is applied to the damper jackshaft.
7. Individual damper sections shall not be larger than 48" x 60" (1.2m x 1.5m). Provide a minimum of one damper actuator per section.
8. Ruskin CD60 airfoil, CD-36 Triple V or Engineer-approved equal.

2.5 LOCAL CONTROL PANELS

A. All indoor control cabinets shall be fully enclosed NEMA 1 construction with hinged door, key-lock latch, baked enamel finish, removable subpanels, wall-mounted or freestanding. All temperature control panels on the project shall be keyed alike.

B. Panels shall house the microprocessor, modem, communication interface, all controllers, relays, indicators, transmitters, switches, pilot lights, override timers, etc., to allow quick access for adjustment and troubleshooting.

C. Manual switches and indicating devices shall be flush-mounted on panel face. Provide engraved plastic or lithographed metal nameplates for all items on the panel face.

D. Interconnections between internal and face-mounted devices prewired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminal blocks shall be provided for all field connections, and shall be UL listed for 300-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring.

1. Control terminations for field connection shall be individually identified per control drawings.
2. All internal wiring between panel mounted devices and field terminal blocks shall be marked on both ends with the appropriate identifying tag.

E. Provide on/off power switch with over-current protection to each local panel. Provide a 120 volt duplex outlet inside each control panel that houses a DDC controller if there is not an outlet within 5 feet (1.5m) of the enclosure.

2.6 AUXILIARY DEVICES - ELECTRIC

A. Current-operated switches shall be self-powered, solid state split core with manually adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system. The current switch shall have sufficient accuracy and hysteresis to detect drive belt failure. Where used in conjunction with variable frequency drives the current operated switch shall be recommended for such service by the manufacturer. Neilsen-Kuljian, Veris Industries, or Engineer-approved equal.

B. Damper end switches shall be UL listed, line voltage SPDT snap-acting, pilot duty rated (125 VA minimum) NEMA 1 enclosure, with roller type actuating arm suitable for damper position application. Switches containing mercury are not acceptable.

C. Control relays shall be UL listed plug-in type with dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage suitable for application. Idec series RH-L, ULAC or Engineer-approved equal.

D. Control transformers shall be UL listed, Class 2 current-limiting type or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.

E. Manual control switches shall be UL listed for use in NEMA 1 enclosures with contact arrangement and rating suitable for application. Bat handle or knob actuator with nameplate clearly identifying function of each switch position.

2.7 ACTUATORS AND POSITIONERS - ELECTRIC

A. Externally Mounted Damper Actuators:

1. The actuator shall be direct-coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The fastening clamp assembly shall be of a "V" bolt design.
2. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the entire rotation of the actuator. Mechanical end switches or magnetic clutch to deactivate the actuator at the end of rotation are not acceptable.
3. For power-failure/safety applications, a spring return mechanism shall be built into the actuator. All spring return actuators shall be capable of both clockwise and counterclockwise spring return operation by simply changing the mounting orientation.
4. Proportional actuators shall have a control input signal compatible with the control system. All actuators shall provide a 2 to 10 dc position feedback signal.

5. All 24V ac/V dc actuators shall not require more than 10V A for AC or more than 8 watts for DC applications. Actuators operating on 120V ac power shall not require more than 10V A.
6. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb torque capacity shall have a manual crank for this purpose.
7. Actuator size and rating shall be suitable for intended application.
8. Damper actuators shall be selected per manufacturer's recommendations to provide sufficient close-off force to effectively seal damper.
9. Furnish a separate actuator for each damper section.
10. Actuators shall be UL 873or UL60730-1A/-2-14 listed.
11. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque and shall have a 2-year manufacturer's warranty. Manufacturer shall be IS09001 certified. Actuators shall be as manufactured by Belimo or Engineer-approved equal.

B. Internally Mounted Damper Actuators:

1. Electric actuators shall be either, direct coupled or rotary (gear-train) type for two-position or modulating service as required by application. All electric actuators shall be UL listed with NEMA 1 enclosures, unless otherwise specified.
2. Actuators shall be permanently lubricated; gear-train units shall be oil-immersed type or shall have permanently lubricated high-density polymer gears.
3. Ambient temperature range shall be at least 40° to 120°F (4 to 49°C), except actuators subjected to outdoor ambients shall have ambient range of -20° to 125°F (-29 to 52°C) minimum.
4. Input signal requirements and voltages compatible with controller output signals.
5. Actuator size and rating shall be suitable for intended application.
6. Damper actuators shall be selected per manufacturer's recommendations to provide sufficient close-off force to effectively seal damper. Modulating actuators shall provide smooth modulating control under design flow and pressure conditions. Furnish a separate actuator for each damper section.
7. Actuators shall have a spring return to fail to the safe position as indicated on the drawings. Actuators relying on batteries are not acceptable.

2.8 BUILDING CONTROLLERS

A. DDC controllers shall function as totally stand-alone units to monitor and control individual systems in accordance with the specified sequence of operation, incorporating field devices to perform operational status and alarm functions.

B. Each DDC controller shall contain all necessary hardware and software functions as required to interface installed sensors and control devices with the building network, and shall contain sufficient memory to support the operating system, Database, data logging, and programming requirements at its maximum point configuration. The Building controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours. Imminent failure of backup batteries (if used) shall be reported as a service alarm.

C. Input/Output Capability:

1. All input and output points shall be protected such that shorting the point to it, another point, or to ground will cause no damage to the controller. All I/O points shall be protected from the direct application of 24V, such that no damage to the controller shall occur.
2. Analog Input (A/I) Function: Monitor each analog input, perform A/D conversion and hold the digital value in a buffer for interrogation. A/I's shall be sampled twice per second or better. Minimum resolution of A/I conversion shall be twelve bits. All analog inputs shall have programmed high- and low-alarm values, unless otherwise specified. A short or open on the input wiring shall cause an alarm and the controller shall use the last valid value for control. Status (value) shall update at intervals not exceeding one second.
3. Digital Input (D/I) Function: Accept dry contact closures and voltage level transitions. Withstand continuous direct shorting to 24V ac, 60 Hz power without failure. Status (value) shall update at intervals not exceeding one second.
4. Pulse Accumulator Function: Same characteristics as the D/I, except that in addition a buffer shall be required to totalize pulses between interrogations. The pulse accumulator shall accept rates up to 10 pulses/second.
5. Analog Output (A/O) Functions: Accept digital data and perform D/A conversions. Minimum resolution of A/O conversion shall be 8 bits. Output signal shall be compatible with system actuators, or shall be industry standard voltage or current type with I/P transducers.
6. Digital Output (D/O) Function: Provide contact closures for momentary and maintained operation of field devices. Closures shall have a minimum duration of one second. Provide isolation and protection against voltage surges up to 300V ac peak. Minimum DO contact rating shall be two amps at 24 to 240V ac, pilot duty; supplementary control relays shall be furnished when necessary.
7. Provide individual manual override switches for each digital and analog output. Provide means to manually adjust signal level of analog outputs in override mode. Each switch shall be individually supervised to indicate the switch is not in the automatic position.

D. Local DDC controllers shall be selected to provide a minimum of 15% unused I/O point capacity at each location. If input points are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required.

E. The local DDC controllers shall have an on-board keypad interface with a minimum 28-alphanumeric character display, or shall be capable of communication through a plug-in portable service tool or CRT/keyboard terminal. If on-board interface is not included, one such portable terminal shall be provided as part of the base contract. Use of the portable tool shall not interrupt communications from the controller to the high- or low-level networks.

F. Each primary controller shall include a real-time clock, two-way communication ports for transfer of data to and from the Local (building) Area Network, and shall also include at least two industry standard ports for use by a portable laptop terminal, phone modem, and/or a service tool.

G. Controllers shall be fully supervised to detect both internal and I/O failures. Upon failure, the stand-alone panel shall automatically force outputs to a pre-determined state. A message shall be transmitted to the central interface unit indicating local failure.

H. Controllers shall be protected from unauthorized access. If not provided with limited access as standard, install in an auxiliary enclosure with key lock.

I. Immunity to power and noise: Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5-120 Hz and from keyed radios up to 5 watts at 3 feet (.9m).

J. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.

1. Controllers used outdoors and/or in wet ambient shall be mounted in waterproof enclosures and shall be rated for operation at -40˚F to 140˚F (-40˚C to 60˚C).
2. Controllers used in conditioned ambient shall be mounted in dust-proof enclosures and shall be rated for operation at 32˚F to 120˚F (0˚C to 50˚C).

K. Serviceability: Provide diagnostic LEDs for power, communications, and processor. All wiring connections shall be made to be field removable, modular terminal strips or a termination card connected by a ribbon cable.

2.9 BUILDING CONTROLLER SOFTWARE

A. The custom application programming language shall be based on the syntax of BASIC or C. Program code shall be liberally commented so that a user unfamiliar with programming languages can understand the program. Alternatively, the programming language may be graphically based using function blocks as long as blocks are available that directly provide the functions listed below, and that custom function blocks can be created. Provide all of the software and/or CAE required to modify all controller's programs and databases. Provide complete software and programming manuals for each type of controller on the project.

B. All I/O point status readouts shall indicate the engineering units; i.e., on, off, open, closed, gpm, cfm, fpm, °F, psi, inches w.g., etc. The displayed value of commands to valves and dampers shall take into account the spring range of those devices and display the actual commanded position. 100% shall indicate the open position.

C. Software shall provide Run-Time Totalization as follows:

1. Provide monitoring and totalization of the run times for all digital outputs that have a corresponding status input.
2. A high run time alarm shall be assigned. Unique, user-specified messages shall be generated when the limit is reached.
3. Run times can be reset by an operator having the necessary access level. The date on which the value was reset shall be logged.
4. Run times shall be totalized up to 9999 hours before resetting to 0. Automatic resetting to 0 shall generate a suitable message.
5. The totalization routine shall have a sampling resolution of one minute or less.

D. Alarm Functions:

1. Digital, analog and high/low settings and deadband.
2. Conditional alarms with If/Then/Else logic.

3. Alarm inhibiting (lockout of alarms when equipment is off).
4. Fluttering alarm suppression.
5. Customized alarm messages of at least 70 characters (at central workstation).
6. Where applicable assign each alarm point a return-to-normal deadband.
7. Any analog value which is the result of a mathematical calculation shall be assignable as an alarm.
8. An alarm point can be inhibited by another digital point if desired. The condition of the digital point when the inhibit condition occurs can be operator programmed for either an open contact or a closed contact.
9. Provide time delays for alarms that are easily changed by the user.
10. Alarms with appropriate analog limits and inhibit (alarm lockouts) shall be assigned to each analog point.
11. Warning and alarm set points shall track control set points whenever another condition or variable resets the control set points.
12. Alarms shall be assigned to each digital point. Provide command fail interlock for digital outputs.

E. DDC controllers shall count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly, or monthly basis.

1. The event totalization feature shall be able to store the records associated with a minimum of 9999.9 events before reset.
2. There shall be a user adjustable warning limit. Unique user-specified messages shall be generated when the limit is reached.

F. Diagnostics:

1. Capable of self-diagnosing without a query by an operator.
2. Alarm a power failure or a communication failure with any controller. Repeat alarms at programmable intervals while the situation remains unattended and unacknowledged. Acknowledging and silencing alarms shall be a simple procedure from a remote PC or the central interface controller.

G. All software, compilers, engineering tools and systems required for the user to modify or create new custom applications and modify the database for any programmable devices used on this project shall be provided.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Demolition: This Contractor shall remove all unused controls including devices, conduit, wire, and pneumatic tubing. Disposition of hardware shall be coordinated with the Owner. Selected material shall be returned to the Owner. Coordinate work with other trades.

3.2 CONTROL EXECUTION - GENERAL

A. This Contractor shall provide all required control interface relays, including control contactors for single-phase pumps and fans (1/2 hp (375W) or less) and any isolation relays required for interface to 3-phase magnetic starter control circuits. All power wiring to single-phase motors and 3-phase starters by Division 26; all control function (interlock) wiring by the Controls Contractor.

B. This Contractor shall be responsible for providing control power to all his controllers and devices requiring control power including installation of any required breakers, unless such wiring is shown on the Division 26 drawings.

C. This Contractor shall function as the Systems Integrator to establish interoperability with the controls system its LAN and controllers provided by other Sections including variable frequency drives (VFD), air handlers furnished with packaged controls, chillers and boilers, and other equipment designated to be connected on the LAN. This Contractor shall map all points indicated, connect wiring, provide any required converters, bridges or gateways and assure seamless bi-directional communication and interoperability and full functionality of the interface.

D. Hand-Off-Auto switches at the MCC shall energize equipment in both the 'hand' and 'auto' mode (when auto is commanded on for auto mode). Safeties shall protect equipment in the hand and auto modes. Where fans are interlocked with damper end switches, the hand and auto positions shall open the dampers and the damper end switch shall energize the fan.

3.3 CONTROL WIRING

A. All control and interlock wiring shall comply with the national and local electrical codes and Division 26 of these specifications. Where the requirements of this section differ with Division 26 the more restrictive requirements shall take precedence. Control wiring shall be concealed except in equipment rooms.

B. All Power (line voltage) and Class 1 wiring shall be UL listed in approved raceway per NEC and Division 26 requirements.

C. All Power limited circuits (Class 2 or Class 3) shall be UL listed in approved raceway per NEC and Division 26 requirements.

D. Size wire in accordance with manufacturers recommendations and the NEC.

E. All wiring shall be installed as continuous lengths with no splices permitted between termination points.

F. All control wiring shall be installed in a neat and workmanlike manner parallel to building lines with adequate support.

G. This Contractor shall terminate all control and/or interlock wiring and maintain updated (as-built) wiring diagrams with terminations identified at the job site.

H. Flexible metal conduits and liquid-tight, flexible metal conduits shall not exceed 3 feet (.9m) in length and shall be supported at each end. Flexible metal conduit less than 1/2-inch (13mm)

electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.

I. Provide conduit seal-offs where portions of an interior raceway system pass through walls, ceiling or floors which separate adjacent rooms having substantially different maintained temperatures or when a raceway goes from indoors to outdoors.

J. Wiring for analog inputs shall not be run in conduit containing 120V ac wiring or any wiring that carries switched signals or any noise-generating sources. Pneumatic tubing shall not be in the same conduit with wiring.

K. Follow manufacturer's installation recommendations for all communication and network cabling. Network or communication cabling shall be run separately from other wiring. When plenum cable is not allowed, LAN or communication wire shall be installed in a dedicated raceway. Other wiring in communications raceway is not allowed.

3.4 TRANSIENT VOLTAGE PROTECTION

A. This Contractor shall provide and install:

1. Transient voltage protection, on all incoming 120V ac power to all controllers (except VAV controllers).
2. Transient voltage protection for all twisted pair, and coaxial data communication lines between controllers. Provide all required repeaters to ensure signal integrity.
3. Transient voltage protection on all phone lines.
4. Lightning arrestors on all communications and other wiring that exit the building. Locate the arrestor at the point of building entrance.
5. Provide ground connection sized and installed in accordance with the manufacturers instructions.

3.5 CONTROL PANELS

A. Field wiring to panels shall be enclosed in metal raceway.

B. Panels shall be mounted at eye level for accessibility and service.

C. Local control panels shall be located within 50 feet of the system served unless otherwise shown on plans.

D. Mount panels on solid non-vibrating surfaces in areas free from moisture or water accumulation. Where such surfaces are not readily accessible, mount the panel on a rigid unistrut stand attached to the floor. The sides of ducts and air handling units are not acceptable mounting surfaces.

3.6 FIELD DEVICE INSTALLATION

A. Actuators: Mount and link control damper actuators per manufacturer's instructions.

1. To compress seals when spring return actuators are used on normally closed dampers, power actuator to approximately a 5-degree open position, manually close the damper, and then tighten the linkage.
2. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

3.7 IDENTIFICATION

A. All control equipment shall be clearly identified by control shop drawing designation as follows:

1. Other remote control devices and sensors: metal tags; plastic laminate labels; or, on non-porous surfaces only, permanent label tape as produced by the Brother “Easy Touch” label maker. Do not attach tag or label to removable covers, etc. Rivet or stick to device or adjacent surface.
2. Control panel doors - engraved nameplate with panel number and systems served.
3. Devices in control panels: engraved plastic tags; metal tags; or, on non-porous surfaces only, permanent label tape as above, mounted to panel adjacent to control device. 1/4-inch-high letters minimum
4. All wiring, including wiring within factory-fabricated panels, shall be labeled within 2 inches of termination with DDC point number/controller number or other descriptive information.
5. All metal and plastic engraved labels shall be secured with chains, nylon tie-wraps, or rivets. Screws with exposed threads are not acceptable. Permanent adhesive is acceptable only when mechanical fasteners would damage the labeled equipment.
6. All switches, relays, and panel components shall be labeled. Relays shall be labeled such that removal of the relay does not move the label.
7. Raceway identification: For ease of identification, junction and pull box covers shall be color coded. Coordinate the color of the junction box covers with Division 26 and the Owner.

3.8 TESTING

A. Prior to substantial completion, the control system shall undergo a series of tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed their own performance tests.

B. The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process. Control system testing shall be coordinated with the Commissioning Contractor and scheduled with the Owner's representative.

C. Contractor shall provide at least two men equipped with two-way communication, and shall test actual field operation of each control and sensing point for all modes of operation including day, night, summer, winter, occupied, unoccupied, fire/smoke alarm, and power failure modes. The purpose is to test the calibration, response, and action of every point. Any test equipment required to prove the proper operation shall be provided by and operated by the Contractor. The

Commissioning Agent and the Owner's Representative (at their discretion) may observe and review these tests.

1. The system software shall be complete such that each control loop shall function as specified in the Sequence of Operation. This contractor shall be required to furnish the software program and test the operation of every program branch and control loop.
2. This Contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the specification.

D. A point-to-point verification shall be made for each input and each output to the system. The check shall include the operator workstation such that the correct point assignment at the workstation is also verified. The calibration of all input and output points shall be tested, documented and calibrated as needed.

END OF SECTION 23 0913

SECTION 23 3700 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

C. Register: A combination grille and damper assembly over an air opening.

1.3 SUBMITTALS

A. Product Data:

1. For each model indicated, include the following:

a. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
b. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
c. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
d. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

2. Provide sufficient submittal data for air distribution devices to verify that required space sound levels will not be exceeded.

1.4 SYSTEM DESCRIPTION

A. Performance Criteria: All equipment and material furnished under this section shall be selected so required RC sound levels in various spaces are not exceeded. Attenuation by ceilings, duct liner, and room absorption may be taken into account when making fan, terminal unit, and air distribution selections. Refer to the latest edition of the ASHRAE Applications Handbook for further information.

PART 2 - PRODUCTS

2.1 GRILLES, REGISTERS, AND DIFFUSERS

A. Approved Manufacturers: Anemostat, Carnes, Carrier, Krueger, Metal Aire, Nailor, Price, Tempmaster, Titus, Trane, and Tuttle & Bailey.

B. Air outlets and inlets shall be performance tested and rated in accordance with and ASHRAE Standard 70 "Method of Testing for Rating the Performance of Air Outlets and Inlets."

C. Provide grilles, registers, diffusers, slots, and accessories of size and type as indicated and/or scheduled on the drawings. Select devices so required space RC sound levels are not exceeded.

D. All grilles, registers, and diffusers shall have white baked-on enamel finish.

E. Provide ceiling grilles, registers, and diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. (Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling diffuser.)

1. Provide trim frames on all surface mount diffusers installed in gypsum board construction.

2.2 LOUVERS

A. Approved Manufacturers: Air Balance, Airstream, American Warming and Ventilating, Arrow, Creative Metals, Dowco Corp., Greenheck, Louvers & Dampers, Inc., Penn Ventilator Co., Ruskin, and Vent Products.

B. All louvers shall be tested in accordance with AMCA Standard 500 and shall bear the AMCA Certified Ratings Seal for both air performance and water penetration.

C. Size and location as shown and/or scheduled on the drawings.

D. Fixed Blade Aluminum Louvers:

1. Extruded aluminum
2. Invisible vertical mullions
3. Box frame with sill extension 6 inches thick. Drainable blades with downspouts (6 inches)
4. 3/4-Inch aluminum expanded metal bird screen with removable formed aluminum channel frame mounted on dry side
5. Finish, color by Architect.
6. 48" x 48" louver shall have approximately 8 square feet of free area (50%).
7. Equal to Ruskin ELF 6375 DX (6-inch, drainable)

2.2 INTAKE AND RELIEF HOODS

A. Approved Manufacturers: Acme, Carnes, Cook, Greenheck, Louvers and Dampers, Penn Ventilator, and Vent Products.

B. Hoods shall be selected for a maximum air pressure drop of 0.1-inch w.g. for intake and 0.05-inch w.g. for exhaust applications.

C. Hoods shall bear AMCA seals for rated airflow performance.

D. Finish shall be standard mill finish.

E. Hood construction shall be heavy-duty aluminum or galvanized sheets with rolled interlocking hood seams. Galvanized steel hood supports shall provide reinforcement. Airshaft vertical seams shall be continuously welded.

F. Hoods shall be "low profile design" and shall be specifically designed for the intended use.

1. Hoods shall have expanded aluminum or galvanized metal bird screen, 85% minimum free area.
2. Throat sizes shall be the same sizes as connected duct sizes shown on the drawings.
3. Relief hoods shall have outlet area a minimum of twice the throat area.

G. Intake hoods shall be furnished with 2-inch-thickaluminum expanded metal cleanable filters. Intake area shall be sized to limit filter velocity to 375 fpm and provide a maximum pressure drop (clean) of 0.06 inch.

H. Provide 12-inch-highinsulated roof curbs for all intake and relief hoods.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Grilles, Registers, and Diffusers:

1. Grilles, registers, and diffusers shall be installed level and plumb and supported per manufacturer's recommendations and per the International Building Code.

a. Ceiling-mounted air devices (supply diffusers and/or return and exhaust grilles and registers) or services weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.
b. Devices or services weighing 20 pounds, but not more than 56 pounds, in addition to the above, shall have two 12-gauge hangers connected from the device or service to the ceiling system hangers or to the structure above. These wires may be slack.

c. Air devices or services weighing more than 56 pounds hall be supported directly from the structure above by approved hangers.

2. Ductwork visible behind grilles, registers, and diffusers shall be painted flat black.
3. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
4. Refer to architectural reflected ceiling plan for locations of grilles, registers and diffusers.

B. Louvers:

1. Louvers shall be installed per architectural details and/or the manufacturer's recommendations.
2. Frames shall be caulked weather-tight to structure using approved material from Division 07.

C. Intake and Relief Hoods:

1. Install of roof curb with counterflashing. Coordinate with roof installer.
2. Fasten hood to roof curb to prevent overturning.

3.3 ADJUSTING

A. Grilles, Registers, and Diffusers: Throw patterns (directions) shall be furnished and/or adjusted to match those shown and/or scheduled on the drawings.

END OF SECTION 23 3700

SECTION 26 0500 - BASIC ELECTRICAL MATERIALS& METHODS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all items, articles, materials, equipment, operations and/or methods listed, mentioned, shown and/or scheduled on the drawings and/or in these specifications, including all labor, services, permits, fees, utility charges, and incidentals necessary and required to perform and complete the electrical work described in this Division. Apply for all permits early in the project to avoid problems due to code revisions.

B. See the contract conditions (general and supplementary) and Division 1 for requirements concerning this Division including, but not limited to, submittals, shop drawings, substitution requests, change orders, maintenance manuals, record drawings, coordination, permits, record documents and guarantees.

C. Division 26 Contractor shall be responsible for all work indicated by divisions 26, 27, 28, and the electrical portions of 33 within the drawings and specifications. Any work indicated by Division 16 shall be provided and installed by the Division 26 Contractor.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Mechanical equipment motors to be furnished under another Division but connected under this Division. Verify and coordinate all equipment locations and electrical characteristics with other trades involved in the work. Coordination shall be done prior to rough-in or ordering equipment.

B. Control wiring for mechanical equipment beyond provisions shown on the Electrical Drawings shall be performed under another Division of the work.

1.3 QUALITY ASSURANCE

A. Do all work in accordance with regulations and design and construction standards of the University of Utah, National Electrical Code, state and local codes and amendments, National Fire Codes, and all other applicable codes.

1.4 PROJECT CONDITIONS

A. The Contractor shall inspect the job site prior to bidding and familiarize himself with existing conditions which will affect the work. Prior to start of work, obtain "As built", "Record", or other Drawings showing existing underground utilities.

B. Electrical drawings are diagrammatic indicating approximate location of outlets, lighting fixtures, electrical equipment, etc. Consult the Architectural, Structural, and Mechanical Drawings to avoid conflicts with equipment, structural members, etc. When required make all deviations from

Drawings to make the work conform to the building as constructed, and to related work of others. Minor relocations ordered prior to installation may be made without added cost to Owner.

C. Call to the attention of the Engineer any error, omission, conflict or discrepancy in Drawings and/or Specifications. Do not proceed with any questionable items of work until clarification of same has been made.

D. Under no conditions are beams, girders, footings or columns to be cut for electrical items unless so shown on Drawings or written approval obtained from the Engineer.

E. Verify the physical dimensions of each item of electrical equipment to fit the available space and promptly notify the Engineer prior to roughing-in if conflicts appear. Coordination of equipment to the available space and to the access routes through the construction shall be the Contractor's responsibility.

1.5 SHOP DRAWINGS

A. Prior to ordering equipment, and prior to Contractor's first application for payment, the Contractor shall, within 14 days after award of this work, submit six (6) complete shop drawings, neatly bound in 3-ring binder form, with indexed tabs, to the Architect, of materials and equipment he proposes to furnish. It is preferred that all sections be submitted at once, however, in the event that one or more sections need approvals quickly and others are not prepared yet, the Engineer will agree to review the individual section submittals needing immediate approval. However, each individual submittal section must be complete and remaining submittals that are not a rush shall be submitted all in one package as quickly as possible. Submitting individual sections over many weeks/months will not be tolerated.

B. List shall bear Contractor's stamp, signature or other means to show that he has inspected same and certified that submitted material is correct in regard to quantity, size, dimension, quality and is coordinated with the Contract Documents.

C. See individual sections within this Division for products requiring submittal.

D. Each shop drawing submittal shall be prepared by the manufacturer, and shall clearly show manufacturer's name, catalog numbers, pictures, details, layout, type, size, rating, style, and all options identified in a permanent fashion. Specific items or options shall be permanently marked on sheets containing more than one option – do not rely on the Engineer to mark options. Yellow highlight will not be an acceptable means of marking.

E. Some sections of this Division may require shop drawings prepared on full size floor plans in AutoCAD or other CAD software. Where required, contact the Architect for the latest version of the floorplans and match the size and scale of the construction drawings. Drawings delivered to the contractor from the Architect/Engineer may not include addenda changes. Contractor shall only use floor plans for purposes of the construction on this job, and not for any other use or reuse. Add any required addenda items prior to finishing submittals.

F. Provide complete materials (all materials) list at the beginning of each tabbed section showing "Specification Section," "Material Item," "Manufacturer's Name and Catalog Number," and all pertinent data.

G. Contractor agrees that Shop Drawing Submittals processed by the Engineer are not Change Orders; that the purpose of Shop Drawing Submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.

H. Contractor further agrees that if deviations, discrepancies or conflicts between Shop Drawings and Specifications are discovered either prior to or after Shop Drawing Submittals are processed by the Engineer, the design Drawings and Specifications shall control and shall be followed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be new and bear manufacturer's name, model number, electrical characteristics and other identification. All equipment to be U.L. approved or listed by another testing agency approved by authorities having jurisdiction.

B. Material and equipment shall be standard product of manufacturer regularly engaged in production of similar material for at least five years (unless specifically exempted) and shall be manufacturer's latest design.

C. If the description of a product is in conflict with the product as specified in the catalog number, the description shall generally take precedence. Contact the Engineer for clarification if this occurs.

D. All equipment for essential or life safety systems must be rated and certified for the appropriate seismic design category or seismic use group for the installed location.

2.2 DISCONNECTS

A. Safety and disconnect switches to be Heavy duty quick-make, quick-break, dual rated, lockable, and of such electrical characteristics as required for the load served. Switches to have defeatable cover interlock.

B. Fuse clips shall accept Class L fuses if required. Motor rated toggle switches equal to Square D Class 2510, type F with thermal overloads may be used as motor disconnects in dry locations.

C. Disconnect switches required by code shall be installed whether or not specifically shown on the Drawings. Disconnect switches for refrigeration equipment and multiple motor HVAC equipment shall be fusible type.

D. Safety and disconnect switches (fuse, non-fuse or circuit-breaker type) to be of same manufacturer as switchgear and panelboards.

2.3 FUSES

A. Provide fuses as indicated on the drawings, sized per NEC, or as required by the equipment manufacturer, whichever provides maximum protection, for a fully operational system.

B. All fuses shall be furnished of the same manufacturer.

C. All fuses shall be installed by the electrical contractor at job-site and only when equipment is to be energized. Fuses shall not be installed during shipment.

D. All fuses to be 200,000 AIC, Current-limiting, U.L., Time Delay, Dual-element Type as follows:

For feeders 600 Amps and less:

Class RKk-1 for 600 volt; LPS-RK, LLS-RK, & A6D-R
Class RK-1 for 250 volt; LPN-RK, LLN-RK, & A2D-R
Class J; JHC, JTD, & AJT

For motor circuits beyond the main and sub distribution boards, 600 volt and below:

Class RK-5 for 600 volt; FRS-R, FLS-R, & TRS-R
Class RK-5 for 250 volt; FRN-R, FLN-R, & TR-R

E. SPARE PARTS: Provide 10% spare fuses, but not less than 3 of any one size and type.

F. Approved Manufacturers, with catalog numbers listed in order: Bussman, Littelfuse, Ferraz Shawmut.

G. If the electrical contractor wishes to furnish materials other than those specified, a written request, along with a complete short circuit and selective coordination study, shall be submitted to the engineer for evaluation at least 8 days prior to the bid date. If the engineer's evaluation indicates acceptance, a written addendum will be issued listing the other acceptable manufacturer.

2.4 BOXES

A. Outlet and junction boxes shall be sized in accordance with code requirements or as noted on the drawings.

B. Unless otherwise specified or shown on the drawings, all outlet boxes for new work shall be galvanized steel knockout, outlet boxes. Gangable boxes are not acceptable. Outlet boxes shall not be smaller than 4" square and 1-1/2 inches in depth, unless otherwise noted. All outlet box covers, rings, or other fittings shall be galvanized. Boxes which are exposed to the weather shall be cast metal. Outlet boxes for phone and data outlets shall be 2.5" deep boxes.

C. Outlet boxes shall be designed for the intended use, and shall be installed flush with finish surface lines or not more than 1/8 inch back and shall be level and plumb. Long screws with spaces or shims for mounting devices are not acceptable. No combustible materials shall be exposed to wiring at outlets.

D. Outlet boxes on opposite sides of fire or sound isolating partitions shall have a minimum horizontal separation of 24". Back to back boxes are not permitted in any walls.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION METHODS

A. All items, articles, materials, and equipment specified under this Division shall be installed per the manufacturer's installation instructions. Where the manufacturer's instructions are in conflict with the directions provided elsewhere in this Contract, the Engineer shall be notified prior to beginning rough-in.

B. Cutting or notching shall be kept to an absolute minimum and done when, and in a method approved by the Engineer. Patch and correct finished surfaces damaged by electrical work.

C. Relays, panels, cabinets and equipment shall be level and plumb and installed parallel with structural building lines. All equipment and enclosures shall fit neatly without gaps, openings, or distortions. Provide approved devices for closing all unused openings.

D. Arrange circuit wiring as shown on the Drawings and do not alter or combine runs or homeruns without the specific approval of the Engineer. Feeder runs shall not be recombined or altered.

E. Contactors, transformers, starters and similar noise producing devices shall not be placed on walls which are common to occupied space.

F. Ballasts, contactors, starters, transformers and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

G. In general, the mounting heights shall be as noted on the Drawings, or as listed below, the Interior Elevations and drawing notes taking precedence. Where no heights are indicated, request clarification from the Engineer. Consult the Architectural, Mechanical and Structural drawings to avoid conflicts prior to roughing-in and for exact locations. All dimensions are to the top of the back box or device whichever is higher. Lighting dimensions are to the bottom of suspended fixtures and center of wall mounted fixtures unless otherwise noted.

Light Switches	48 inches to top
Convenience Receptacles	20 inches to top
Data/Telephone Outlets	20 inches to top
Disconnects and Motor Controllers	72 inches to top
Fire Alarm Signals	96 inches to top (but at least 6" below ceiling)
Fire Call Stations	48 inches to top

H. Where raceways penetrate floors, ceilings, ducts, chases, and fire walls, provide fire stopping to maintain integrity of the fire assembly. Firestopping method shall be approved by the Code Authority having jurisdiction.

I. All materials and equipment installed under this work shall be properly and adequately supported from the building structure except where ceiling construction or other provisions are specifically designed to support them. Support systems shall provide a safety factor of four. This shall apply to chains, hangers, anchors, clamps, screws, structural iron, and all other hardware and appurtenances associated with the support system.

J. Rough-in for communications outlets for phone and data systems shall consist of a 4" square deep (4SD) box with a single gang mud ring. Provide a .75" conduit for wall phones and a 1" conduit for combination voice and data outlets to an accessible ceiling space. Conduit shall be terminated above the ceiling in a bushing and a pull string installed.

K. Maintain the following minimum separations from voice and data cables: Power conduit - 12", transformers and motors - 40", fluorescent lighting - 12". Coordinate with the voice and data installer to assure these separations are met.

3.2 LOW VOLTAGE WIRING METHODS

A. Provide Conduit homeruns complete for all low voltage systems. Plenum cabling will not be acceptable.

B. Conductors shall be concealed by conduit in all spaces and shall be run parallel to structural lines and supported at minimum 10' intervals from structure.

C. All low voltage cable must be suitable for the conditions in which it will be used. Prior to purchasing or installing any cable, confirm with the Mechanical Contractor which areas, if any, require plenum rated cable.

D. Provide a box, plaster ring, and conduit with insulated bushing from each wall or floor outlet to an accessible ceiling or crawl space. Conduit shall be minimum 3/4" for telephone, minimum 1" combined voice and data outlets, and sized as needed for other systems. Drawings notes shall take precedence. Raceways for phone and data cable shall be sized based on the number of cables in accordance with the following guidelines.

3/4 inch conduit	max 4 cables
1 inch conduit	max 8 cables
1.25 inch conduit	max 14 cables
1.5 inch conduit	max 19 cables
2 inch conduit	max 32 cables

E. Furnish and install all necessary sleeves and raceways to permit the installation of signal cables (specific attention is called to non-contiguous ceiling spaces) to the appropriate equipment termination point. Provide sleeves through all fire-rated walls and partitions. No outlets of any type shall be left without a raceway system or accessible ceiling path to their termination point. Verify that raceway sizes and quantities are appropriate and will have at least 50% spare capacity after all cables are initially installed. Provide at least one empty spare conduit to each area, sized to handle future needs.

3.3 LABELING

A. Clearly and properly label the complete electrical system to indicate the loads served or the function of each item of equipment provided under this work.

B. Permanent Engraved nameplates: shall be 1/16 inch thick, laminated three-ply plastic, center-ply white, outer-ply black (for normal power) or red (for emergency power) or orange (for UPS power) "Lamicoid" or equal. Letters shall be formed by engraving outer colored ply, exposing white center-ply, and shall be a minimum of 5/8 inch high. Nameplates shall be secured with screws or pop rivets.

C. Provide permanent engraved nameplates for the equipment listed below as well as all other similar equipment; refer to each section for specific labeling requirements:

1. Switchboards and Panelboards
2. Motor Controllers, Variable Frequency Drives (VFD), Safety Disconnects
3. Electrical Contactors and Relays
4. Other similar electrical devices and equipment

D. Self-Adhesive Labels: shall have self-adhesive “P-Touch” or equivalent sticky backs, black lettering with a clear (see through) background.

E. Provide self-adhesive labels for the devices and equipment listed below as well as all other similar equipment; each label shall list the applicable circuit number feeding the device and devices fed from Emergency or UPS power shall also list “EMERGENCY” or “UPS” as applicable next to the circuit number (for example, a receptacle fed from circuit 2 in panel 1P1 would read “1P1-2” on the label):

1. Thermal Switches and Manual Starters
2. Power outlet receptacles
3. Light Switches, and Wall Mount timeswitches
4. Fire alarm initiation devices (smoke detectors, heat detectors, pull stations, etc.)
5. Fire alarm notification devices (horn/strobes, etc.)

F. For Service switchboards, panelboards, and/or disconnecting means, provide a permanent engraved label indicating maximum available fault current as calculated by the Engineer. Include the date calculation was made.

G. Where existing service entrance components are modified, including where conductors are increased in size, or the service transformer or service disconnecting means is replaced or increased in size, provide a new permanent engraved label on each service switchboard, panelboard, and/or disconnecting means with required information as indicated by the National Electrical Code.

H. Provide neat and clearly legible handwritten labeling using a permanent “Sharpie” or equivalent chisel tip black marker for all junction boxes containing power and fire alarm wiring. Label each junction box with the applicable circuit number(s) for the cables contained within each junction box in a location and large enough to be clearly visible from the floor.

I. Provide a laminated copy of the electrical one line diagram(s), size of sheets as required to be clearly visible. Permanently mount within main electrical room, coordinate final location with architect.

J. Where changes are made in existing panels, distribution boards, etc., provide new labeling and schedules to accurately reflect the changes.

3.4 SAFETY

A. The Engineer has not been retained or compensated to provide design and construction review services relating to the Contractor's safety precautions or to means, methods, techniques, sequences or procedures required for the contractor to perform the work.

3.5 DEMOLITION

A. It is the intent of these specifications to require the contractor to make all necessary adjustments to the electrical system, required to meet code, and accommodate installation of the new and remodeled work.

B. Remove all existing fixtures, clocks, switches, receptacles, raceways, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless specifically shown as retained or relocated on the drawings. If existing walls, ceiling, floors, etc. are moved, extend existing devices, fixtures, and circuiting to the new location.

C. Disconnect all existing mechanical equipment scheduled for removal or relocation. See mechanical drawings for scope of work. Remove abandoned raceways and cables. Relabel panels and motor control centers to reflect changes.

D. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, new conduit and wire shall be provided to bypass the abandoned outlets. If existing conduits pass through or are mounted on partitions or ceilings which are being removed or remodeled, new conduit and wire shall be provided to route around the ceiling or wall and maintain service to the existing load.

E. Extend circuiting and devices in all existing walls to be furred out.

F. Locations of items shown on the drawings as existing are partially based on as-built and other drawings which may contain errors. The Contractor shall verify the correctness of the information shown prior to bidding and provide such labor and material as is necessary to accomplish the intent of the contract documents. The plans may show some demolition conditions, but are not intended to show all of them.

G. All materials accumulated during the demolition process are the Owners property and shall be removed from the job site as directed by the Owner. If owner does not wish to salvage materials, contractor shall remove from jobsite and dispose, or recycle materials at contractor’s discretion, in a lawful manner.

H. Where changes are made in existing panels, distribution boards, etc., provide new labeling and schedules to accurately reflect the changes.

I. Demolish and dispose of hazardous materials in a lawful manner, such as PCB containing transformers or ballasts, mercury containing lamps, or materials containing lead. All costs for proper disposal shall be paid by the contractor unless specified elsewhere in the general conditions.

3.6 POWER INTERRUPTIONS

A. Keep outages to occupied areas to a minimum and prearrange all outages with the Owner's representative and utilities involved. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specified times. When power interruptions will last longer than 5 minutes and cover more than 10% of the building, or affect public areas, they shall be performed on the weekends between 1 and 5 AM.

B. Contractor shall coordinate with the Owner so that work can be scheduled not to interrupt operations, normal activities, building access, etc. Coordinate work with other crafts for proper scheduling.

C. No circuits shall be turned off without prior approval from owner. Coordinate with the Owner any interruptions which affect the operation of the remaining portions of the facility.

D. This contractor will be liable for any damages resulting from unscheduled outages or for those not confined to the preapproved times. Include all costs for overtime labor as necessary to maintain electrical services in the initial bid proposal. Temporary wiring and facilities, if used, shall be removed and the site left clean before final acceptance. Requests for outages must be submitted at least (5) days prior to intended shutdown time.

E. Include in bid cost of minimum temporary power for Fire Alarm System, Security, Telephone/Data equipment and any other equipment designated by Owner, during time when primary building power has been interrupted.

3.7 GROUNDING

A. Ground all electric equipment, raceways and enclosures in accordance with code rules and established safety practices. Provide a single main grounding point where grounding conductors from the Grounding Electrode System ground rods, ground grids, water pipes, main switchgear, etc. may be terminated.

B. Grounds shall be installed where accessible for future inspection and servicing. Where ground connections are made underground or in inaccessible locations, they shall be made using an exothermic weld process, Cadweld or equivalent, or Ampact pressure connectors.

C. Install grounding conductors in approved metallic raceways unless specifically shown or specified otherwise. Bond at each end and at all intervening boxes and enclosures between the service equipment and grounding electrode.

D. No. 8 and smaller grounding conductors shall have green insulation. No. 6 and larger shall be marked with green colored tape at each end and at every box, panel, switchboard, or point where conductor is accessible.

E. All isolated ground buses shall be used only for conductors from isolated ground receptacles. Do not bond conduit or enclosures to isolated ground buses. All isolated ground conductors shall be run back to the main ground point for the separately derived system which serves them.

3.8 EQUIPMENT CONNECTIONS

A. The location and method for connecting to each item of equipment shall be verified prior to roughing-in. The voltage and phase of each item of equipment shall be checked before connecting. Motor rotations shall be made in the proper direction. Pump motors are not to be test run until liquid is in the system and proper lubrication to all bearings in unit is checked.

B. Conduit, wire and circuit breaker sizes for mechanical, elevator and similar equipment are based on the equipment ratings of one manufacturer. The equipment actually furnished may have entirely different electrical characteristics. Conduit, wire, circuit breakers, disconnects, etc. shall not be ordered or installed until exact electrical requirements are obtained. Responsibility for this coordination rests with the Contractor.

3.9 SEISMIC BRACING

A. Furnish and install all seismic bracing of equipment, feeders, lighting fixtures, and other electrical items in accordance with prevailing codes. Refer to ASCE 7-05, section 13.6 for calculation methods. Provide and submit the required designs, calculations, certifications, and stamped drawings to the authority having jurisdiction and obtain their approval prior to installation or fabrication.

B. Where conduit, cable trays, or busducts are attached to structures where they cross a seismic isolation interface, the electrical components shall be designed to accommodate the seismic relative displacement.

3.10 PAINTING

A. All electrical equipment and conduit exposed in finished areas and on exterior walls are to be painted to match surrounding surfaces.

B. Contractor shall coordinate the timing of painting requirements.

C. Refer to Architectural specifications for methods and materials.

3.11 PROJECT RECORD DOCUMENTS

A. Maintenance of Documents:

1. Maintain at Jobsite, One Record Copy of: Contract Drawings, Specifications, Addenda, Reviewed Shop Drawings, Change Orders, Other Modifications to Contract and Field Test Records.
2. Keep apart from documents used for construction.
3. Keep documents available at all times for inspection by Architect.

B. Recording:

1. Label each document "PROJECT RECORD."
2. Keep record documents current. Do not permanently conceal any work until required information has been recorded.
3. Contract Drawings, legibly mark to record actual construction; including but not limited to the following:

    a. Depths of various elements; locations of underground items, with dimensions to building walls and corners; changes of dimensions and details; changes made by Addendum, Field Orders or Change Order.
    b. Specifications and Addenda; legibly mark each Section to record changes made by Addendum, Field Order or Change Order.

C. As-Built Submittals: At completion of project, transfer changes, addenda items, variations from drawings, exact routes of all feeders and service conduits, and locations of stubbed conduits to clean new prints and specifications which will be supplied by the Architect and deliver to the Architect as "As-reported Record" drawings. Include dimensions to all buried or concealed conduits to permanent structures.

D. Operation and Maintenance Manuals

1. At completion of project, prepare Operation and Maintenance Manuals with operation and Maintenance Data, contractors warranties, and copies of approved electrical permits. Include corrected copies of original submittals and shop drawings.
2. See Division 1 for additional requirements.

3.12 WARRANTIES

A. Provide a minimum 1 year warranty on all electrical equipment, devices, labor, and work by Division 26 whether specified or not.

B. Provide warranties greater than 1 year as specified in other sections where stated. The warranty requirement most stringent shall be used where conflicts arise.

C. Provide copies of all warranties to the owner upon completion of the project.

3.13 COMPLETION

A. Complete each system as shown or specified herein and place in operation except where only roughing-in or partial systems are called for. Each system shall be tested and left in proper operation free of faults, shorts or unintentional grounds. Demonstrate system in the presence of the Architect, the Owner or their representative when requested.

3.14 FINAL OBSERVATION

A. Contractor shall submit written certification that:

1. Contract Documents have been reviewed.
2. Contractor has inspected Project for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and Systems have been tested and are operational.
5. Project is completed and ready for final inspection.

B. Engineer will make final inspection as soon as possible after receipt of Certification.

C. Should Engineer consider that work is finally complete in accordance with Contract Document requirements, Contractor shall make Contract Closeout submittals.

D. Should Engineer consider that work is not finally complete:

1. He will so notify Contractor, stating reasons.
2. Contractor shall take immediate steps to remedy deficiencies, and send second written notice to Engineer certifying that work is complete.
3. Engineer will re-inspect work.

E. The Engineer will make two final inspections. The first will determine deficiencies and errors in the work and the second will determine whether or not the noted deficiencies and errors have been satisfactorily corrected.

F. If additional inspections are required because of the Contractor's failure to complete the deficiencies and errors prior to the second inspection, costs for the successive inspections will be back-charged to the Contractor by the Owner, who, in turn, will reimburse the Engineer. Charges will be based as follows:

1. Engineer time at current billing rates.
2. Travel time, and all other expenses incurred in making inspections.

G. Contractor to provide one (1) journeyman, tools, meters, instruments and other test equipment required by Engineer. Contractor to remove and replace trims, covers, fixtures, etc., for Engineer to review and test materials, systems, methods and workmanship. (Example: Removing switchboard and panel covers to take voltage/amp readings, review connections and wire size, etc.).

END OF SECTION 26 0500

SECTION 26 0519 - WIRES AND CABLES (600V)

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all wires and cables as herein specified and shown on the associated drawings for service conductors, feeder conductors and branch circuit conductors.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Material & Methods – Section 26 05 00.

B. Raceways – Section 26 05 33.

1.3 QUALITY ASSURANCE:

A. All wire and cable shall meet or exceed the following standards:

1. ASTM-B series specifications
2. ICEA S-61-402/NEMA WC 5 - Thermoplastic insulated cables 0-2000 volt
3. UL Standard 62 and 83 – Thermoplastic insulated cable
4. UL VW-1 Flame Test for sizes #12 through #1
5. National Electric Code (NFPA 70) – Latest edition

B. Manufacturer's shall be engaged in the manufacturing of industry accepted quality wires and cables for a period of no less than 5 years for all types and sizes required.

1.4 SUBMITTALS

A. None required.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide products of Southwire, Houston Wire, Rome Cable, or similar manufacturer located within the continental North American market. Cables made in Europe, Asia, South America, Africa, or other overseas markets are not acceptable.

B. Substitutions: Equivalent manufacturers are allowed at contractors option, no submittals or prior approvals are necessary if cable meets specifications.

2.2 MATERIALS

A. Application: For use in general wiring applications for lighting and power in ducts, conduits, wireways and other approved raceways with a maximum conductor temperature of 90 degrees C in dry locations and 75 degrees C in wet locations.

B. Provide wires and cables that are chemical, gasoline, and oil resistant.

C. Minimum conductor size shall be No. 12 AWG unless otherwise noted.

D. Where adverse conductor exposure exists, code approved insulation suitable for the conditions encountered shall be used unless shown otherwise on the Drawings.

E. Wire and cable shall be new, shall have grade of insulation, voltage and manufacturer's name permanently marked on outer covering at regular intervals and shall be delivered in complete coils or reels with identifying size and insulation tags.

2.3 COPPER CONDUCTORS

A. For No. 10 AWG and smaller provide soft drawn stranded copper conductors with type THHN/THWN insulation.

B. For No. 8 AWG and larger provide soft drawn stranded, Class B stranded copper conductors with type THHN/THWN insulation.

2.4 ALUMINUM AND/OR METAL CLAD (MC) CABLING OPTIONS

A. Aluminum and MC Cabling not acceptable – Provide copper only conductors.

2.5 COLOR CODE

A. All wire shall be fully colored in sizes 12 and 10 AWG, and color banded at each end and at all junction and pull boxes for size 8 AWG and larger.

B. Color Code throughout the project shall be:

1. 480Y/277V System

Phase A	Brown
Phase B	Orange
Phase C	Yellow
Neutral	Grey
Neutral A (dedicated)	Grey w/black stripe #12 & #10
Neutral B (dedicated)	Grey w/orange stripe #12 & #10
Neutral C (dedicated)	Grey w/yellow stripe #12 & #10
Equipment Ground	Green

2. 208Y/120V System

Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Neutral A (dedicated)	White w/black stripe #12 & #10
Neutral B (dedicated)	White w/red stripe #12 & #10
Neutral C (dedicated)	White w/blue stripe #12 & #10
Equipment Ground	Green
Isolated Ground	Green w/yellow stripe #12 & #10
	Green and Yellow bands #8 and up

C. Provide a permanent, plastic engraved label on the inside of each branch-circuit panelboard throughout the project identifying the Color Code used throughout the project. Refer to NEC 200.6 (D).

2.6 SPLICES AND TERMINATIONS

A. Splices shall utilize Scotch "Hyflex" or "Ideal" wing nut connector installed properly. Crimp on splices designed to be used without wire stripping are not acceptable.

B. Splices for No. 8 and larger wires shall be made with mechanically applied pressure type connectors.

C. All taped joints shall be with "Scotch 33+" or equal, applied in half-lap layers without stretching to deform.

D. Where splice box is subject to rain, weather, or moisture, provide “Rain Tight” termination device.

E. Terminations of conductors passing through “high heat zones”, shown on the drawings, shall be 90°C rated lugs.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inspect exposed cables for physical damage and remove as length allows.

B. Utilize pulling compound on long pulls.

C. Do not exceed manufacturer’s minimum bending radius or tension during installation.

D. Provide dedicated neutrals on all branch power receptacle circuits of 120/208 volt.

3.2 BRANCH CIRCUIT GROUNDED CONDUCTOR (NEUTRAL) WIRING METHODS

A. Dedicated (separate) neutral wiring methods

1. Provide dedicated neutral wiring for the following system(s):

   a. Lighting
   b. Receptacles
   c. Other than lighting and receptacle branch circuits

2. Provide dedicated (separate) neutral for each branch circuit; shared/common neutral wiring is not allowed.
3. For dedicated neutral branch wiring, there shall be no more than six (6) current-carrying conductors allowed within a single raceway unless specifically allowed otherwise in the drawings. All neutral conductors shall be considered current carrying. Provide all required wire size increases to account for the applicable NEC wire ampacity deratings.
4. Provide dedicated neutral cables with colored stripe as required in wire color coding section for identification.

3.3 SPLICES AND TERMINATIONS

A. Splices are to be made up complete promptly after wire installation.

B. Single wire pigtails shall be provided for fixture and device connections. Wirenuts may be used for fixture wire connections to single wire circuit conductor pigtails.

C. Install wing nut connector properly, according to manufacturers written instructions. Crimp on splices designed to be used without wire stripping are not acceptable.

D. Torque bolted connections to manufacturers recommendations.

E. Insulation shall be removed with a stripping tool designed specifically for that purpose. A pocket knife is not an acceptable tool. All conductors shall be left nick-free.

F. Thermoplastic insulated wire and cable shall not be installed or handled in temperatures below +14°F (-10°C). Cross-linked polyethylene insulated wire and cable may be installed to -°F (-40°C).

3.4 LABELING

A. Service Cables - Provide an engraved laminated 3-ply plastic “Lamicoid” or equal label which designated as “SERVICE CABLE(S)” attached with a nylon wire tie to the cables at each entry and exit from pullboxes, wireways and any other similar locations.

B. Feeders – Provide an engraved laminated 3-ply plastic “Lamicoid” or equal label with feeder name attached with a nylon wire tie to the feeder at each entry and exit from pullboxes, wireways and any other similar locations.

C. Branch Circuits – Clearly mark and identify the circuit number(s) at each junction box and similar location with a permanent black marker or equivalent that is clearly visible. For concealed junction boxes the marking shall be made on the outside coverplate; for exposed boxes or boxes with finished coverplates marking shall be made on the interior of the box where visible when removing the coverplate.

3.5 COMMISSIONING AND TESTING

A. Contractor shall provide for access and inspection of installed wires and cables by the Architect/Engineer, owner and commissioning agent.

B. Document all tests and provide written copies in the O&M manuals.

C. Perform continuity tests and resistance measurements through bolted connections to ensure correct cable connections.

D. Perform insulation resistance test on all feeder conductors exceeding 100 amps, size #2 and larger. Values shall not be less than 50 megaohms.

END OF SECTION 26 0519

This page intentionally left blank.

SECTION 26 0526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all grounding and bonding as code required and as herein specified and shown on the associated drawings.

1.2 APPLICATION

A. All grounding and bonding shall be by copper only connectors, copper cable and wire, and/or copper braids.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Material & Methods – Section 26 05 00.

B. Wires & Cables – Section 26 05 19.

1.4 QUALITY ASSURANCE

A. All installation of grounding and bonding conductors shall meet or exceed the following standards:

1. Exceeds ANSI/IEEE 142 for service ground electrode resistance (2.5 ohms rather than 5 ohms).
2. ASTM B 8 stranded conductors
3. ICEA S-61-402/NEMA WC 5 - Thermoplastic insulated cables 0-2000 volt
4. UL Standard 62 and 83 – Thermoplastic insulated cable
5. 4.UL VW-1 Flame Test for sizes #12 through #1
6. National Electric Code (NFPA 70) – Latest edition
7. UL listing is required

B. Manufacturers shall be engaged in the manufacturing of industry accepted quality grounding connectors for a period of no less than 5 years for all types and sizes required.

1.5 SUBMITTALS

A. None required.

PART 2 - PRODUCTS

2.1 GROUNDING CONNECTORS AND GROUND RODS

A. Acceptable Manufacturers: Subject to compliance with all requirements, provide products of one of the following manufacturers for grounding connectors or ground rods:

1. Chance/Hubbell
2. Copperweld Corporation
3. Erico Inc., Electrical Products Group
4. Burndy Electrical
5. Kearney/Cooper Power Systems
6. O-Z/Gedney Co
7. Raco/Hubbell
8. Thomas & Betts Electrical

B. Provide products of a quality manufacturer located within the continental North American market. Grounding connectors made in Europe, Asia, South America, Africa, or other overseas markets are not acceptable.

C. Provide products that are listed and labeled by UL for all applications used, and for specific types, sizes and combinations of conductors and other items connected.

D. For buried connections, provide crimp style connections or welded type connections. For accessible connections, provide bolted pressure-type, torque as per manufacturers recommendations.

E. Substitutions: Equivalent manufacturers are allowed at contractor’s option, no submittals or prior approvals are necessary if ground connectors and rods meet specifications.

2.2 CONDUCTORS

A. Provide copper or tinned-copper wire and cable insulated for 600 volt unless otherwise required by applicable code or authorities with jurisdiction.

B. Provide No. 4 and/or No. 6 AWG stranded conductor for bonding conductors.

C. Bonding Jumper: Provide copper tape, braided copper conductors, terminated with copper ferrules, 1-5/8 inches wide and 1/16 inch thick.

PART 3 - EXECUTION

3.1 GROUNDING INSTALLATION

A. Ground all electric equipment, raceways and enclosures in accordance with code rules and established safety practices. All grounding systems inside the building must be bonded to the

main power service ground, including telecom closets, TV cabling entrances, lightning protection systems, and computer data center grounds. es

B. Install insulated equipment grounding conductors in all types of raceways for all power feeders and branch circuits

C. Route grounding electrode conductors along the shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subject to strain, impact, or damage.

D. Grounding electrode conductors and bonding jumper connections to grounding electrodes shall be accessible (unless allowed by NEC 250.68(A) exceptions) and provide a continuous effective grounding path.

E. Where ground connections are made underground or in inaccessible locations, they shall be made using an exothermic weld process, Cadweld or equivalent, or Ampact pressure connectors.

F. Install main grounding electrode conductors in approved metallic raceways unless specifically shown or specified otherwise. Bond at each end and at all intervening boxes and enclosures between the service equipment and grounding electrode.

G. No. 8 and smaller grounding conductors shall have green insulation. No. 6 and larger shall be marked with green colored tape at each end and at every box, panel, switchboard, or point where conductor is accessible.

H. Provide bonding jumpers to steel structure as indicated on the plans. Use exothermic welded connectors for steel connections below slab, and/or bolted clamp connections where accessible above slab.

I. For equipment subject to vibration, install bonding jumper so that vibration is not transmitted through the grounding connection.

3.2 CONNECTIONS

A. For equipment grounding connections #10 and smaller, grounding conductors may be terminated with appropriate winged pressure type connectors (wirenuts). For #8 and larger, use pressure-type grounding lugs.

B. Where metallic raceways terminate at metal housings without appropriate electrical connection to housing, terminate each conduit with an insulated throat grounding bushing. Connect grounding bushing with a bare copper grounding conductor to grounding bus and/or grounding terminal electrically bonded to housing.

C. For all main telephone/data conduits and sleeves exceeding 1-1/2 inches, where serving telephone/data closets and data rooms, provide insulated throat grounding bushings. Connect grounding bushing with a bare copper grounding conductor to grounding bus inside telecomm room.

D. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturers published torque-tightening values. If manufacturers data is not available, tighten according to UL468A.

E. For compression type connections, use hydraulic compression tools and dies to provide the correct circumferential pressure for all connectors. Use only tools and dies as recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible, permanent indication that a connector has been adequately compressed onto the grounding conductor.

3.3 COMMISSIONING AND TESTING

A. Contractor shall provide a time for access and inspection of grounding system for the Architect/Engineer, telecommunications installer and the commissioning agent. Correct all defects and flaws found prior to testing.

END OF SECTION 26 0526

SECTION 26 0533 - RACEWAYS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all raceways, wireways, and associated fittings as herein specified and shown on the associated drawings.

1.2 APPLICATION

A. Electric metallic tubing (EMT), galvanized rigid conduit (GRC), intermediate metal conduit (IMC), flexible metal conduit, and PVC conduit may be used.

B. Schedule 40 PVC conduit may only be used below grade and below slabs on grade. PVC shall not be used above grade. PVC shall not be used in masonry walls and shall not be used in suspended slabs. Conduits larger than 1 inch may be run below the slab. Type EB and DB utility duct shall not be substituted for Schedule 40 PVC.

C. GRC and IMC shall be used in locations subject to mechanical injury, for penetrations of building and manhole walls, and for service conduit under concrete slabs. GRC and IMC may be used: outside, where exposed to weather, in wet locations, in hazardous locations (as approved by code). Schedule 80 PVC may not be substituted for GRC and IMC.

D. EMT may be used only in dry and protected locations and in suspended slabs. EMT may not be used: outside, where exposed to weather, in hazardous locations or where subject to mechanical injury.

E. Flexible metal conduit (FMC) will be permitted only where flexibility is necessary. FMC may be used only where flexibility is necessary in dry protected locations, such as: connections to recessed light fixtures, work fished into existing concealed dry locations, wood frame construction. Flexible metal conduit shall be used for connection to all equipment subject to movement or vibration such as motors and transformers. Length shall not exceed 6 feet unless specified otherwise.

F. Liquid-Tight Flexible Metal Conduit (LFMC) shall substitute only in those locations where flexible metal conduit is required and additional moisture protection is desired or needed. LFMC may be used: for connections to motors or fixed equipment where subject to moisture or weather and subject to movement or vibration. Length shall not exceed 6 feet unless specified otherwise.

G. Drawing notes requiring a specific type of raceway shall take precedence over the specifications.

H. Surface metal or Plastic raceways (Wiremold) shall not be used.

I. Electrical wiring shall be in U.L. approved raceways and enclosures throughout.

J. 4" and larger conduits intended for use on primary services and communications services shall have minimum 48" radius sweep on all bends.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Material & Methods – Section 26 05 00.

B. Wires and cables (600V) – Section 26 05 19.

1.4 QUALITY ASSURANCE

A. All installation of conduits and raceways shall meet or exceed the following standards:

1. Polyvinyl Chloride (PVC): In accordance with ANSI C80.1 and NEMA Std. Pub. No. RN 1.
2. Rigid Metal Conduit (RMC): in accordance with ANSI C80.1.
3. Electric Metallic Tubing (EMT): in accordance with ANSI C80.3.
4. Seismic Bracing: ASCE 7-05, Section 13.6, latest edition
5. National Electric Code (NFPA 70) – Latest edition
6. UL listing is required

B. Manufacturer's shall be engaged in the manufacturing of industry accepted quality raceway for a period of no less than 5 years for all types and sizes required.

1.5 SUBMITTALS

A. None required.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide products of a quality manufacturer located within the continental North American market. Conduit and Raceways made in Europe, Asia, South America, Africa, or other overseas markets are not acceptable.

B. Substitutions: Equivalent manufacturers are allowed at contractor's option, no submittals or prior approvals are necessary if conduit and fittings meet specifications.

2.2 RACEWAYS

A. Galvanized Rigid Metal Conduit (GRC): Provide zinc-coated, hot-dipped galvanized, rigid metallic conduit in sizes indicated on the drawings. Provide RMC in ¾ inch minimum size.

B. Intermediate Metal Conduit (IMC): Provide hot-dipped galvanized, intermediate metal conduit in sizes indicated on the drawings. Provide IMC in ¾ inch minimum size.

C. Electric Metallic Tubing (EMT): Provide electric metal tubing in sizes indicated on the drawings. Provide EMT in ¾ inch minimum size.

D. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight, flexible metal conduit, constructed of single strip, flexible continuous, interlocked, and double-wrapped steel, galvanized inside and outside, coated with liquid-tight jacket of flexible Polyvinyl Chloride (PVC). Provide Liquid-Tight Flexible conduit in ¾ inch minimum size.

E. Provide Schedule 40 PVC conduit (where installed below grade or below slab on grade) in one inch minimum size.

F. Surface metal raceways equal to Wiremold (700 series unless noted otherwise) may be used only where specifically called for on the drawings or in the specifications. Such installation shall be directed and approved by the Architect prior to ordering raceway.

G. Surface plastic raceways are not acceptable.

H. Aluminum conduit is not acceptable.

I. Provide EMT in ¾ inch minimum size; EMT in ½" inch minimum size may be used for fire alarm and low voltage (< 30 volts) control wiring only.

J. Provide PVC conduit in one inch minimum size.

2.3 FITTINGS

A. EMT Connectors and couplings shall be steel concrete tight set screw type with insulated throats on connectors. Die-cast fittings or fittings made from pot metal shall not be allowed. Indenter type fittings are not acceptable

B. Connectors larger than 1-1/4 inch shall utilize equivalent of O-Z/Gedney type SBT/SB insulated bushings.

C. GRC and IMC shall be coupled and terminated with threaded fittings. Provide fully-threaded, malleable steel fittings, rain-tight and concrete-tight as applicable. Provide double locknuts and metal bushings at all conduit terminations. Ends shall be bushed with insulating bushings (OZ Gedney type B or equal).

D. PVC shall be provided with matching schedule 40 fittings.

E. FMC and LFMC fittings shall be in accordance to industry standards.

F. Sealing bushings are to be provided equal to O-Z/Gedney Type FSK, WSK or CSMI as required by application. Provide equal to O-Z/Gedney Type CSB for internal sealing busings.

G. Expansion fittings shall be equal to O-Z/Gedey AXDX.

H. Cable Supports: Provide OZ Gedney, or equivalent cable supports for vertical risers, type as required by application.

I. Aluminum conduit fittings are not acceptable.

2.4 SEISMIC BRACING COMPONENTS

A. Provide the following components for vertical support and lateral/longitudinal seismic bracing:

1. Strut: Unistrut (or equal) P1000 Metal Framing Channel
2. Allthread: Stainless Steel, 3/8 minimum size
3. Angles/Hinges: Bline B335-2 or Mason Industries SCB Swivel Anchor
4. Expansion Anchors: Hilti Kwik Bolt II (or equal) minimum 3/8 inch x 2-1/4 inch depth.
5. Hardware: Miscellaneous cap screw/spring nuts and other hardware required for a complete system.

2.5 BOXES

A. Refer to section 26 05 00 for appropriate boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide pull boxes where shown or required to limit the number of bends in any run to not more than three 90 degree bends. Use code gauge galvanized sheet steel boxes of code required size with removable covers, installed so that covers will be accessible after work is completed. Verify with the Architect any locations in finished areas.

B. Exposed raceways shall be parallel to structural lines and location must be approved by Architect/Engineer prior to installation. Where exiting from masonry walls in exposed rooms, particular attention and detail should be taken to exit in a neat and orderly fashion, at the correct elevation to hit structural steel roof supports.

C. Avoid placing conduits within 1-1/2 inches of the upper flutes of roof decking.

D. Maintain a minimum of 6 inches spacing from Hot water and/or steam lines, and 2 inches from Chilled Water and Culinary Water lines. Do not support conduit from other utility services.

E. 4" and larger conduits intended for use on primary services and communications services shall have minimum 48" radius sweep on all bends.

F. Conceal all raceways and wiring in finished spaces.

G. All conduit leaving building envelope (e.g. site lighting, roof mounted HVAC requirement, etc.) to be 0.75" minimum.

H. Field bends and offsets shall be made without flattening, kinking, rippling or destroying the smooth internal bore or surface of the conduit and to not less than NEC minimum radius. Conduit that shows signs of rippling or kinking shall not be installed. Any conduits installed with wrinkles or kinks or otherwise in an unworkmanlike manner shall be replaced at no additional cost to owner.

I. Precaution shall be exercised to prevent accumulation of water, dirt, concrete, or other foreign matter in the conduits during the execution of the project. Conduits in which water or foreign matter has been permitted to accumulate shall be thoroughly cleaned or the conduits runs replaced where such accumulation cannot be removed by methods approved the engineer.

J. Permanently cap all spare conduits. Cap or plug conduit ends during construction to prevent entrance of foreign material.

K. For metal conduit systems, provide electrically continuous conduit systems throughout.

L. Conduit stubbed from a concrete slab or wall to serve an outlet under a table or to supply a machine shall have a rigid conduit coupling flush with the surface of the slab. Provide plug where conduit is to be used in future.

M. Conduits in above grade suspended slabs, where written approval is obtained from the Structural Engineer of Record, shall be located in the middle of the slab and spaced according to the minimum recommendations of the ACSE 9-91. There shall be no crossovers, and conduit must be spaced a minimum of 18 inches on center. Conduits larger than one inch shall not be run in suspended slabs.

N. If work in suspended slabs is approved, EMT must be placed on stands and tied down to prevent floating prior to concrete pour. A minimum of 1-1/2 inch of concrete cover below the conduit and above the conduit is required. The Architect/Engineer must be invited to review and approve the installation prior to the concrete pour. Contractor shall rework any conduit rough that is disapproved.

O. Avoid placing conduits in pre or post tensioned slabs. The maximum size, spacing, and location of conduits in pre or post-tensioned slabs shall be subject to approval by the Structural Engineer.

P. Provide ground wire within all conduits sized per NEC code.

3.2 SUPPORT AND SEISMIC BRACING INSTALLATION

A. Conduit racks shall be adequately braced for Seismic Restraint, as required per ASCE 7-05, Section 13.6, latest edition.

B. For 3 or more conduits install conduit racks with trapeze style hanging system, with stainless steel 3/8 inch all-threads hanging down to a Galvanized steel strut assembly. Provide conduit clips to rigidly clip conduit to strut.

C. Provide a diagonal lateral seismic restraint braces at maximum 10 foot intervals (alternating directions), and a longitudinal brace (alternating directions) at maximum 30 foot intervals. Braces must be made of strut or similar rigid material, and will be tied directly to trapeze strut with

hinges or rigid angles. Wire ties for bracing will not be acceptable. All hardware made for bracing shall be seismically rated.

D. If a large number of suspended conduit feeders (more than 12 each exceeding 2-1/2 inches in size) are grouped together, the contractor shall review the layout with the structural engineer, provide estimated weights, and obtain approval for the proposed layout.

E. Hanger rods shall be fastened to structure in an approved manner. Pullout resistance shall have a safety factor of 4.

F. Support individual suspended feeder conduits by metal ring or trapeze hangers with threaded steel rods

G. Support spacing shall be in accordance with the following table, in addition to these maximum spacing requirements the seismic support and bracing may require additional support and/or spacing supports less than the maximum distance indicated below; the most stringent requirement and shortest spacing distances shall be enforced.

Conduit Type	Conduit Size	Max. distance between conduit supports	Max. distance from outlet box, junction box, cabinet, fitting, conduit termination or bends larger than 22 degrees
IMC/GRC	½" to ¾" 1" 1.25" to 1.5" 2" to 2.5" 3" and larger	10 feet 12 feet 14 feet 16 feet 20 feet	3 feet for all sizes
EMT	All Sizes	10 feet	3 feet
FMC	All Sizes	4.5 feet	1 foot
LFMC	All Sizes	4.5 feet	1 foot

3.3 FIELD CUTS AND THREADS

A. Cut all conduits perpendicular and square. Remove all sharp or rough edges and ream all burrs, inside and outside.

B. Provide clean sharp threads on RMC and IMC. Engage at least five full threads on all RMC and IMC fittings.

C. Before couplings or fittings are attached, apply one coat of red lead or zinc chromate to male threads of RMC or IMC.

D. Apply coat of red lead, zinc chromate or special compound recommended by manufacture to conduit where conduit protective coating is damaged.

3.4 EXPANSION AND SEISMIC JOINTS

A. Expansion Joints:

1. All conduits crossing expansion joints where cast in concrete shall be provided with expansion-deflection fittings, equivalent to O-Z/Gedney AXDX, installed per manufacturers recommendations.
2. All conduits three inches and larger where not cast in concrete shall be rigidly secured to the building structure on opposite sides of a building expansion joint with an expansion-deflection fitting across the joint, equivalent to O-Z/Gedney AXDX, installed per manufacturer's recommendations.
3. All conduits less than three inches where not cast in concrete shall be provided with junction boxes securely fastened on both sides of the expansion joint, connected together with 15 inches of slack (a minimum of 15 inches longer than the straight line length) flexible conduit and copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits three inch and larger, may be installed.

B. Seismic Joints:

1. No conduits cast in concrete shall be allowed to cross a seismic joint.
2. All conduits shall be provided with junction boxes securely fastened on both sides of the seismic joint, connected together with 15 inches of slack (a minimum of 15 inches longer than the straight line length) flexible conduit and copper green ground bonding jumper. Prior to installation, verify with Architect that the 15 inches is adequate for the designed movement, and if not, increase this length as required.

3.5 CLEANING

A. Pull a mandril and swab through all conduits before installing conductors. Raceways shall be left clean and free of debris.

B. Provide a pull string in all empty conduits.

3.6 COMMISSIONING AND FINAL INSPECTION

A. Contractor shall provide a time for access and inspection of raceway system for the Architect/Engineer, telecommunications installer and the owner. Correct all defects and flaws found prior to wall and ceiling installation and prior to cabling installation.

B. Demonstrate rigid seismic bracing to ensure minimal movement of the raceways on suspended racks in a seismic event. Demonstration shall be by pushing with at least 25 pounds force laterally and longitudinally at selected (mid-span) locations along the length of the suspended raceway rack. Rack shall not move more than 2 inches during these demonstrations.

END OF SECTION 26 0533

This page intentionally left blank.

SECTION 26 2726 - SWITCHES AND RECEPTACLES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all switches, receptacles, and other devices as herein specified and shown on the associated drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Bryant, Arrow-Hart, Eagle, LaGrande, General Electric, Leviton, Hubbell are acceptable.

2.2 MATERIALS:

A. The following list of wiring devices covers the most commonly specified items and establishes the grade of device. Should the Drawings indicate a device other than those listed herein without reference to catalog number, such device shall be of the same grade and manufacturer as like devices.

Single Pole Switches	Hubbell #1221
Duplex Receptacles - 20 amp	Hubbell #5362

All wiring devices and plates to be specification grade. Receptacles shall be mounted vertically with the ground pin down unless otherwise noted.

B. For normal power, provide white devices as per University standard. Provide stainless steel plates in ALL areas. Receptacles fed by UPS circuits shall have BLUE devices with "UPS POWER" engraved in white letters on a red nylon plate with panel and circuit designation engraved on plate.

C. Wet location and/or weatherproof receptacles shall be in a weatherproof enclosure, the integrity of which is not affected when the receptacle is in use (attachment plug cap inserted), UL labeled and listed “Suitable For Wet Locations While In Use”. Provide enclosure with stainless steel screws, gasket between enclosure and mounting surface and between cover and base, clear impact resistant UV stabilized polycarbonate as manufactured by TayMac Corporation or accepted equivalent.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide a separate GFI type receptacle for each receptacle noted on plans as GFI. Standard receptacles fed from an up-steam GFI type receptacle are not acceptable.

B. Install outlets and switches in a neat manner.

C. Faceplates, devices, and boxes shall be square with floor, and door lines.

D. Devices to be installed flush with faceplate.

3.2 LABELING

A. Provide self-adhesive labels for all switches and receptacles in compliance with Part 3.3 of Section 26 05 00.

B. Where switches control remote lighting or power outlets, or where switches in the same outlet (two or more) serve different purposes, such as light, power, intercom, etc. or different areas, such as corridor and outside, provide self-adhesive labels clearly indicating the function of each switch or outlet.

END OF SECTION 26 2726