



Sheridan Fire Station

Seismic Upgrade

230 SW Mill Street
Sheridan, OR 97378

Project Manual

June 3, 2021

Owner:

Sheridan Fire District
230 SW Mill Street
Sheridan, OR 97378
(503) 843-2467

Architect:

Carlson Veit Junge Architects
3095 River Road N
Salem, OR 97303
(503) 390-0281

Structural Engineer:

MSC Engineers Inc.
3470 Pipebend Place NE, Suite 120
Salem, OR 97301
(503) 399-1399

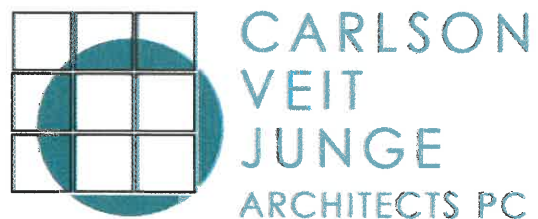
Mechanical/Plumbing Engineer:

RACI Engineering Designs
38515 Pit Road
Philomath, OR 97370
(503) 871-2614

Electrical Engineer:

Landis Consulting
6446 Fairway Avenue SE, Suite 220
Salem, OR 97306
(503) 584-1576

Architect's Project Number:_00419



ARCHITECTURE • INTERIOR DESIGN

WWW.CARLSONVEIT.COM 3095 RIVER RD N SALEM, OR 97303

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SHERIDAN RURAL FIRE PROTECTION DISTRICT

INVITATION TO BID

Contractors are invited to bid on the construction of the seismic upgrade of Station 190 (Project), located at 230 SW Mill Street, Sheridan, OR 97378. The project consists of seismic upgrades and renovations/construction work to the structures located at Station 190, per District specifications. Sealed bids will be received by Fred Hertel, Fire Chief at 230 SW Mill St., Sheridan, OR 97378 at or before 2:00 p.m. Thursday, July 1, 2021. Bids will be publically opened immediately following this closing.

This contract is for a public work subject to ORS 279C.800 to 279C.870, relating to the payment of prevailing wages.

No prequalification will be required for this Project.

The terms, conditions and specifications for this Project (Project Documents) may be examined at Sheridan Rural Fire Protection District (District) office located at 230 SW Mill Street, Sheridan, OR 97378, between the hours of 8:00 a.m. to 5:00 p.m., Monday through Friday until July 1, 2021. The Project Documents will be available at this location and are downloadable from the District website at www.sheridanfd.org from the date of this Notice until July 1, 2021. Copies may be obtained from the District for a non-refundable fee of \$500.

Fred Hertel, Fire Chief
Sheridan Rural Fire Protection District
230 SW Mill St.
Sheridan, OR 97378

INSTRUCTIONS TO BIDDERS

Bids will be received by Sheridan Rural Fire Protection District (hereinafter called District) at 230 SW Mill St., Sheridan, OR 97378, until 2:00 p.m., Pacific Daylight Time, July 1, 2021. Bids will be publically opened immediately following this closing.

Each bid must be submitted in an opaque, sealed envelope, addressed to Fred Hertel, Fire Chief, Sheridan Rural Fire Protection District, at the above address. Each bid must be plainly marked on the outside of the envelope with the name of the bidder, the District's address and "Seismic Upgrade Project." Bids not so marked may be disqualified. If forwarded by mail, the sealed envelope containing the bid must be contained in another envelope addressed to the District at the address listed above. Faxed or electronically submitted bids shall be refused as non-responsive.

This contract is for a public work subject to ORS 279C.800 to 279C.870, relating to the payment of prevailing wages.

No prequalification will be required for this Project.

A voluntary pre-bid conference will be held at 10 a.m. on Friday, June 18, 2021. Statements made by District representatives at that meeting are not binding on District unless confirmed by written addendum.

Contract terms, conditions and Project specifications for this Project (Project Documents) may be examined at the District office located at 230 SW Mill St., Sheridan, Oregon, or downloaded from the District website at www.sheridanfd.org. Copies of the Project Documents may be obtained from the District for a non-refundable fee of \$500.

All bids must be submitted on the required bid form. All blank spaces for bid prices must be completed in ink and the bid form must be fully completed and executed when submitted. Only one copy of the bid form is required. To be considered, each bid must be accompanied by a bid bond or certified check in the amount of 10% of the bid.

Contractor must comply with all federal, state, and local laws or regulations dealing with the prevention of environmental pollution and preservation of natural resources that affect the performance of the Contract.

1. Non-Compliant Bids

The District may reject any bid not in compliance with all prescribed public bidding procedures and requirements. Any bid failing to certify compliance with ORS 279C.800 to 279C.870 *et seq.* will not be received or considered by District. All bids must identify whether the bidder is a resident bidder as defined in ORS 279A.120. The District may reject for good cause any and all bids upon finding it is in the public interest to do so. Any bid may be withdrawn prior to the above scheduled time for the opening of bids, or

any authorized postponement per District Public Contracting Rule (District Rule) 137-049-0320. Any bid received after the closing time and date specified above shall not be considered. No bidder may withdraw a bid within forty (40) days after the actual date of the bid opening. Should there be reasons why the contract cannot be awarded within the specified time, the time may be extended by mutual agreement between the District and the bidder.

2. Bidder Responsibilities

Before submitting a bid, each bidder must:

- (a) Examine the contract documents thoroughly;
- (b) Visit the site, so that the bidder may familiarize itself with local conditions which may, in any manner, affect cost progress, or performance of the Work;
- (c) Be familiar with state, federal, and local laws, ordinances, rules and regulations which may, in any manner, affect cost, progress or performance of the Work; and
- (d) Study and carefully correlate bidder's observations with the contract documents.

3. Instructions for First-Tier Subcontractor Disclosure

Bidders are required to disclose information about certain first-tier subcontractors when the contract value for a Public Improvement is greater than \$100,000 (see ORS 279C.370). Specifically, when the contract amount of a first-tier subcontractor furnishing labor or labor and materials would be greater than or equal to: (i) 5% of the Project Bid, but at least \$15,000, or (ii) \$350,000 regardless of the percentage, the bidder must disclose the following information about that subcontract either in its Bid submission, or within two hours after Bid Closing:

- (a) The subcontractor's name;
- (b) The category of work that the subcontractor would be performing, and
- (c) The dollar value of the subcontract.

If the bidder will not be using any subcontractors that are subject to the above disclosure requirements, the bidder is required to indicate "NONE" on the accompanying form.

THE CONTRACTING AGENCY MUST REJECT A BID IF THE BIDDER FAILS TO SUBMIT THE DISCLOSURE FORM WITH THIS INFORMATION BY THE STATED DEADLINE (see District Rule 137-049-0360).

4. The Importance of Bids and Contract Documents

The submission of a bid will constitute an incontrovertible representation by the bidder: (1) of bidder's intent to be bound by the attached contract documents, if awarded the

contract; (2) that the bidder has complied with each of the requirements within these bid documents; and (3) that the contract documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work. The plans for the Project provide bidders a delineated description of the land owned and the area involving easements. Bidders are to scrupulously follow these boundaries and not encroach upon, in any manner, property owned by any other person.

The contract documents contain the provisions required for the construction of the Project. Information obtained from an officer, agent, or employee of the District or any other person is not binding upon the District, and shall not affect the risks or obligations assumed by the Contractor or relieve Contractor from fulfilling any conditions of this solicitation or the contract, once executed, unless confirmed by written addendum or contract amendment.

5. Requests for Clarification/Addenda

All questions about the meaning or intent of the contract documents shall be submitted to the District representative in writing. If merited, replies may be issued by addendum, mailed or delivered to all parties recorded by the District representative as having received the bidding documents, per District Rule 137-049-0250. Requests for changes and clarifications shall be submitted in accordance with District Rule 137-049-0260. Only questions answered by formal written addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

6. Performance and Payment Bonds

A performance bond and a payment bond, in the forms attached, each in the amount of 100% of the contract price, with a corporate surety approved by the District, will be required for the faithful performance of the contract. Attorneys in fact who sign bid bonds or payment bonds and performance bonds must file with each bond a certified and effective dated copy of their Power of Attorney. All bonding companies must be authorized to do business in the State of Oregon.

7. District Investigation of Bidder

The District may make such investigations as deemed necessary to determine the ability of the bidder to perform work. In determining the lowest responsible bidder, District shall check the list created by the Construction Contractors Board under ORS 701.227 for bidders who are not qualified to hold a public improvement contract and determine whether the bidder has met the standards of responsibility. District shall also consider the following factors and may disqualify any person as a bidder if it finds the bidder:

- (a) Does not have available the appropriate financial, material, equipment, facility and personnel resources and expertise, or the ability to obtain the resources and expertise, necessary to meet all contractual responsibilities;

- (b) Does not hold a current license that a contractor operating in Oregon must hold in order to undertake or perform Project Work;
- (c) Is not covered by liability insurance or other insurance in required amounts;
- (d) Does not qualify as a carrier insured employer or a self-insured employer under ORS 656.407 or has not elected coverage under ORS 656.128;
- (e) Failed to provide a First-Tier Subcontractor Disclosure Form, if required under ORS 279C.370;
- (f) Does not have a satisfactory record of performance. The District shall document the record of performance of a bidder if the District finds the bidder not to be responsible under this paragraph (f);
- (g) Does not have a satisfactory record of integrity. The District shall document the record of integrity of a bidder if the District finds the bidder not to be responsible under this paragraph (g);
- (h) Is not qualified legally to contract with the District; or
- (i) Has not supplied all necessary information in connection with the inquiry concerning responsibility.

Each bidder shall promptly supply information as requested by the District pursuant to such investigation. If a bidder fails to promptly supply information requested by the District concerning responsibility, the District shall base the determination of responsibility upon any available information, or may find the bidder not to be responsible. Failure to supply such information may be grounds for disqualification.

8. Registration and Licenses

No bid for a construction contract shall be received or considered by the District unless the bidder is registered and in good standing with the Construction Contractors Board or licensed and in good standing with the State Landscape Contractors Board, as required by ORS 671.530. Bidders may need to be licensed to work with environmental considerations under ORS 468A.720.

9. Protests

Award and solicitation protests shall be submitted in accordance with District Rule 137-049-0260(3) and 137-049-0450(4), respectively.

10. Process

At least seven (7) days prior to final award, all bidders will receive the District's Notice of Intent to Award issued via email. The District anticipates final Contract award on or before July 16, 2021.

The bidder to whom the contract is awarded will be required to execute the attached agreement and obtain the performance and payment bonds within ten (10) calendar days from the date when Notice of Award is delivered to the bidder. Submittal of a bid indicates bidder's intent to be bound to all terms and conditions of the attached

agreement. The Notice of Award shall be accompanied by the necessary agreement and bond forms. In case of a failure of the bidder to execute the agreement, the District may, at its option, consider the bidder in default in which case the bid bond accompanying the bid shall become the property of the District.

The District, within ten (10) days of receipt of an acceptable performance bond, an acceptable payment bond, and the required agreements signed by the successful bidder, including proof of insurance as required by the contract documents, shall sign and return to the successful bidder an executed duplicate of the agreement and notice to proceed. If the 10-day notice to proceed has not been issued within the 10-day period, or within a period mutually agreed upon, the Contractor may terminate the agreement without further liability on the part of either party. Such termination shall be by written notices and will be effective upon receipt by the District.

The award will be made to the lowest responsible bidder. The Contractor shall submit to the District representative by the last calendar day of each month a partial payment estimate for work performed during the prior pay period. The cutoff date for work performed shall be the 26th day of the month in which a payment estimate is submitted. The District will approve and authorize payment of partial payment estimates approved by the District representative at its regular monthly District meeting.

NOTICE OF INTENT TO AWARD

Sheridan Rural Fire Protection District
Invitation to Bid
Seismic Upgrade Project

To all Bidders:

Based on responses to the recent Invitation to Bid and other information obtained from third party sources, _____ has been identified as the lowest responsible, responsive bidder to contract with Sheridan Rural Fire Protection District for the above referenced Project. Protests regarding this intended award will be received by Fred Hertel, Fire Chief, Sheridan Rural Fire Protection District, 230 SW Mill St., Sheridan, OR 97378, until Friday, July 16, 2021. Award will become final on Friday, July 16, 2021 or once the District responds to all timely filed protests and affirms the award, whichever is later.

It is the District's intent to begin negotiations and enter into a contract for these services with _____, by Friday, July 16, 2021. The District would like to finalize the contract no later than Monday, July 26, 2021, with approval by the District Board on Thursday, August 12, 2021. The contract terms, specifications and conditions were included with the ITB.

If you have any questions, please feel free to call me at 503-843-2467.

Sincerely,

SHERIDAN RURAL FIRE PROTECTION DISTRICT

By: _____

BID FORM

Sheridan Rural Fire Protection District
Invitation to Bid
Seismic Upgrade Project

This bid is submitted to Sheridan Rural Fire Protection District, 230 SW Mill St.,
Sheridan, OR 97378.

1. The undersigned bidder proposes and agrees, if this bid is accepted, to enter into a Construction Agreement with the District in the form included in the contract documents and to complete all work as specified or indicated in the contract documents for the contract price and within the contract time indicated in this bid and in accordance with the contract documents.
2. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation, those dealing with disposition of bid security. This bid may not be amended or withdrawn and is subject to acceptance for forty (40) days after the date of bid opening. The successful bidder will sign the Construction Agreement included as part of the bid packet and submit the security and other documents required by the contract documents within ten (10) days after the date of District's Notice of Award.
3. In submitting this bid, bidder represents as more fully set forth in the Construction Agreement, that:

- (a) Bidder has examined copies of the contract documents and the following addenda:

Date: _____	Number: _____
Date: _____	Number: _____
Date: _____	Number: _____
Date: _____	Number: _____

and also copies of the advertisement or Invitation to Bid and Instructions to Bidders;

- (b) Bidder has examined the site and locality where the Work is to be performed, the applicable legal requirements (federal, state, and local, ordinances, rules, and regulations) and the conditions affecting cost, progress, or performance of work, and has made such independent investigation as bidder deems necessary;
- (c) This bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation, and is not submitted in

conformity with any agreement or rules of any group, association, organization, or corporation; bidder has not directly or indirectly induced or solicited any other bidder to submit a false or sham bid; bidder has not solicited or induced any person, firm, or corporation to refrain from bidding; and bidder has not sought by collusion to obtain for himself any advantage over any other bidder or the District;

- (d) The District does not have to award any contract based on the bids submitted. Any award which the District makes will be on the basis of the lowest responsible bidder.

4. Bid Quantities and Specifications	Unit Price	Total
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Bidder will complete the entire Project for the following total price: \$ _____

- 5. Bidder agrees to prepare the site and perform the labor necessary to complete the construction Project which will be substantially completed in accordance with the plans and specifications attached hereto within _____ days of the receipt of the notice to proceed.
- 6. Bidder acknowledges that bidder has reviewed the provisions of the Construction Agreement as to liquidated damages which may be assessed in the event of failure to complete the Work on time and has considered those potential damages in formulating this bid.
- 7. The following documents are attached to and made a condition to the bid:
 - (a) Required bid security in the form of a bid bond or certified check in the amount of 10% of the bid;
 - (b) Non-Collusion Affidavit;
 - (c) First Tier Subcontractor Disclosure Form (attached to the bid or submitted to the District within two (2) hours after bid closing).
- 8. Bidder agrees and certifies as follows:
 - (a) The provisions of ORS 279C.800 *et seq.*, relating to the prevailing wage rates, will be complied with;
 - (b) Bidder is a resident of the State of _____ as defined in ORS 279A.120;
 - (c) The provisions of ORS 305.385 relating to Oregon tax laws will be complied with;

- (d) Bidder has not and will not discriminate against minorities, women or emerging small business enterprises in obtaining any subcontracts required under this Contract, or against a business enterprise owner controlled by, or that employs, a disabled veteran as defined in ORS 408.225;
- (e) All employers, including bidder, that employ subject workers who work under the Construction Agreement shall comply with ORS 656.017 and provide the required Workers' Compensation coverage unless such employers are exempt under ORS 656.126. Bidder shall ensure that each of its subcontractors complies with these requirements;
- (f) Bidder is registered and in good standing with the Construction Contractors Board in accordance with ORS 701.035 to 701.055;
- (g) All subcontractors performing work as described in ORS 701.005(2) will be registered with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 before the subcontractors commence work under the contract.

9. Communications concerning this bid shall be addressed to:

Bidder: _____

Submitted this _____ day of _____, 202__.

 (Corporate Name) (Company Name)
 (Corporate Seal, if any)

By: _____
 (Name of person authorized to
 Sign, or Title)
 Business Address: _____

 Phone: (____) _____
 State of Incorporation: _____
 Oregon Contractor Board No.: _____

ATTEST:

 Secretary of bidding corporation

NOTICE OF AWARD

To: _____

PROJECT description: Sheridan Rural Fire Protection District (District)
Seismic Upgrade Project (Project)

The District has considered the bid submitted by _____
(Contractor) for the above described Project in response to its advertisement for bids
dated Tuesday, June 15, 2021, and Instructions to Bidders.

Contractor is hereby notified that its bid in the amount of _____
_____ (amount in written form) (\$ _____) has
been accepted by the District.

Contractor is required by the Instructions to Bidders to execute the Construction
Agreement and furnish the required Contractor's Performance Bond, Payment Bond
and certificates of insurance within ten (10) calendar days from the date of this notice.

If Contractor fails to execute the Construction Agreement and to furnish the required
bonds and certificates of insurance within ten (10) days from the date of this notice,
District will be entitled to consider all Contractor's rights arising out of District's
acceptance of Contractor's bid as abandoned and as a forfeiture of Contractor's bid
bond. District will be entitled to such other rights as may be granted by law.

Please return an acknowledged copy of this Notice to Award to District.

DATED this _____ day of _____, 20__.

SHERIDAN RURAL FIRE
PROTECTION DISTRICT

By: _____

* * * * *

ACCEPTANCE OF AWARD

Receipt of the above Notice of Award is hereby acknowledged by _____
_____ on this _____ day of _____, 20__.

By: _____
Title: _____

NOTICE TO PROCEED

TO: _____ Date: _____

Sheridan Rural Fire Protection District (District)
Seismic Upgrade Project (Project)

_____ (Contractor) is hereby notified to commence Project in accordance with the Construction Agreement dated _____, 20__, on or before _____, 20__, and Contractor is to complete the Work on the Project within ____ consecutive calendar days thereafter. The date of final completion for all work is _____, 20__.

Please return an acknowledged copy of this Notice to Proceed to District.

SHERIDAN RURAL FIRE
PROTECTION DISTRICT

By: _____

* * * * *

ACCEPTANCE OF NOTICE TO PROCEED

Receipt of the above Notice to Proceed is hereby acknowledged by _____
_____ on this _____ day of _____, 20__.

By: _____
Title: _____

concealment from the District of the true facts relating to the submission of bids for this contract.

Name of Company: _____
Position: _____

SIGNED and SWORN to before me this _____ day of _____,
20____, by _____.

Notary Public for _____

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

PROJECT NAME: Seismic Upgrade

BID #: _____

BID CLOSING: Date: _____ Time: _____

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time.

List below the name of each subcontractor that is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED.)

NAME	DOLLAR VALUE	CATEGORY OF WORK
1) _____	\$ _____	_____
2) _____	\$ _____	_____
3) _____	\$ _____	_____
4) _____	\$ _____	_____
5) _____	\$ _____	_____
6) _____	\$ _____	_____

FAILURE TO SUBMIT THIS FORM BY THE DISCLOSURE DEADLINE WILL RESULT IN A NON-RESPONSIVE BID. A NON-RESPONSIVE BID WILL NOT BE CONSIDERED FOR AWARD.

Form submitted by (bidder name): _____

Contact Name: _____

Phone No.: _____

BIDDER'S PERFORMANCE AND PAYMENT BOND STATEMENT

_____ (Contractor) is submitting a bid to Sheridan Rural Fire Protection District (District) pursuant to the District's advertisement for bids dated Tuesday, June 15, 2021.

Contractor certifies that, if it is awarded the contract, Contractor has the financial ability to obtain good and sufficient bonds in the forms attached, issued by a surety to the District, each in a sum equal to the amount of the bid providing for the faithful performance of the contract.

Contractor understands and agrees that if Contractor fails to provide either the required performance bond or payment bond, the District may reject the bid and the bid bond submitted with the bid may be forfeited.

The surety requested to issue the performance bond will be _____ (Surety Company). Contractor authorizes Surety Company to disclose any information to District concerning Contractor's ability to supply a performance bond in the amount of the contract.

The surety requested to issue the payment bond will be _____ (Surety Company). Contractor authorizes Surety Company to disclose any information to District concerning Contractor's ability to supply a payment bond in the amount of the contract.

(Name of Contractor)

By: _____

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS that

(Name of Contractor)

(Address of Contractor)

a _____ hereinafter called "PRINCIPAL," and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

(Oregon representative for service of process for Surety)

hereinafter called "SURETY," are held and firmly bound unto

Sheridan Rural Fire Protection District
230 SW Mill St.
Sheridan, OR 97378

hereinafter called "OWNER," in the total amount of _____
(insert here a sum
_____ Dollars (\$ _____) for the
equal to the contract price)

payment whereof PRINCIPAL and SURETY bind themselves, their heirs, executors, administrators, successors and assigns jointly and severally, firmly by these presents.

WHEREAS, the PRINCIPAL has by written agreement entered into a certain contract with the OWNER, dated the _____ day of _____, 20__, a copy of which is hereto attached and made a part hereof and is hereinafter referred to as the Contract. Said Contract is for:

NOW, THEREFORE:

1. The condition of this obligation is such that, if PRINCIPAL shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

2. The SURETY hereby waives notice of any alteration or extension of time made by the OWNER.

3. It is expressly agreed that the Bond shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment of the Contract, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment," wherever used in this Bond, and whether referring to this Bond, the Contract, or any Loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

4. Whenever PRINCIPAL shall be, and declared by OWNER to be in default under the Contract, the OWNER having performed OWNER's obligations thereunder, the SURETY may promptly remedy the default, or shall promptly:

a) Arrange for the PRINCIPAL, with consent of the OWNER, to perform and complete the contract;

b) Complete the Contract in accordance with its terms and conditions,
or

c) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by OWNER and the SURETY jointly of the lowest responsible bidder, arrange for a contract between such bidder and OWNER, and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the SURETY may be liable hereunder, the amount set forth above. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by OWNER to PRINCIPAL under the Contract and any amendments thereto, less the amount properly paid by OWNER to PRINCIPAL.

5. Any suit under this Bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

6. If any provision of this Bond conflicts with state law, such portion will be deemed deleted therefrom and provisions conforming to such state law shall be

deemed incorporated herein. The intent is that the bond shall be construed as a statutory bond and not as a common law bond.

7. No right of action shall accrue on this Bond to or for the use of any person or corporation other than the OWNER named herein or the heirs, executors, administrators or successors of the OWNER.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

PRINCIPAL

(PRINCIPAL) Secretary

(SEAL)

By: _____

(Witness to PRINCIPAL)

(Address)

(Address)

(SURETY)

ATTEST:

(Witness to SURETY)

By _____
(Attorney-in-Fact)

(Address)

(Address)

NOTE: Date of Bond must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners must execute Bond.

IMPORTANT: SURETY companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in Oregon. SURETY companies must also have an Oregon representative for service of process.

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of
Principal Place of Business):

CONTRACT

Effective Date of Agreement:

Amount:

Description (Name and Location):

BOND

Bond Number:

Date (Not earlier than Effective Date of Agreement):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name: _____

Print Name: _____

Title: _____

Title: _____

ATTEST: _____
Signature

ATTEST: _____
Signature

Title

Title

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
 - 4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2 Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. Reserved.
7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.
11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY:

Name, Address and Telephone:

Surety Agency or Broker:

Owner's Representative (Engineer or other):

AGREEMENT

THIS AGREEMENT is made this _____ day of _____, 2021, by and between the Sheridan Rural Fire Protection District, hereinafter called Owner, and _____, hereinafter called Contractor, in consideration of mutual covenants hereinafter set forth, agree as follows:

- 1. Work.** Contractor shall complete all work as specified in the contract documents and in accordance with the documents and drawings provided for the Project known as the Seismic Upgrade Project (Project).
- 2. Materials.** Contractor will furnish all materials, supplies, tools, equipment, labor and other services necessary for the construction and completion of the Project described herein.
- 3. Contract Time.** The Work will commence within ten (10) calendar days after the date of the Notice to Proceed and will be completed by the Contractor and accepted by the Owner no later than _____, 20____, unless the period for completion is extended otherwise by the contract documents or by written agreement of the parties.
- 4. Contract Price.** Owner shall pay Contractor for performance of the Work in accordance with the documents the sum of \$_____ as shown in Contractor's bid.
- 5. Liquidated Damages.** Owner and Contractor acknowledge and agree that if the Work is not completed by the contract time, the amount of Owner's actual loss of use damages will be difficult and impractical, or impossible to determine. Accordingly, the parties agree that if the Project is not completed by the agreed upon date, as adjusted pursuant to the contract documents, the Contractor shall pay \$100.00 per day to Owner, as liquidated damages for the loss of use of the Project.

The parties further acknowledge and agree that the daily sum for liquidated damages to be paid, as set forth above, is reasonable and that the payment of such liquidated damages is not intended to nor constitutes a penalty or forfeiture. The parties further acknowledge that these liquidated damages are meant to reimburse the Owner only for loss of use delay damages and that Owner reserves the right to claim other types of damages against Contractor including but not limited to actual delay damages.

- 6. Progress Payments.** Owner shall make progress payments on the basis of the Contractor's application for payment as approved by the Owner's representative on or about the last day of each month during construction as provided herein. All progress payments shall be on the basis of progress of the Work measured

by the schedule of values provided for in Section 19 of the General Conditions. Prior to substantial completion, progress payments will be an amount equal to not more than 95% of the Work completed and 95% of the materials and equipment not incorporated in the Work, but delivered and suitably stored, less in each case the aggregate of payments previously made. Upon substantial completion, the Owner shall pay an amount sufficient to increase total payments to Contractor to 95% of the contract price, less such amounts as the Owner shall determine in accordance with Section 19 of the General Conditions. Final payment shall be upon final completion and acceptance of the Work. Approved partial payment estimates shall be reviewed and approved at the next regularly scheduled Board meeting.

7. Contract Documents. The term “contract documents” means and includes the following:

- (a) Invitation to Bid;
- (b) Instructions to Bidders;
- (c) Bid;
- (d) Bid Bond;
- (e) Construction Agreement;
- (f) First-Tier Subcontractor Disclosure Form
- (g) Oregon Prevailing Wage Rates;
- (h) General Conditions;
- (i) Payment Bond;
- (j) Performance Bond;
- (k) Notice of Intent to Award;
- (l) Notice to Proceed;
- (m) Drawings and Specifications attached;
- (n) Change Orders;
- (o) Addenda; Number: _____ Dated: _____
- (p) Proof of Insurance

8. Contractor’s Representations. In order to induce Owner to enter into this agreement, Contractor makes the following representations:

- (a) Contractor has familiarized itself with the nature and extent of the contract documents, work, locality, and with all local conditions and any federal, state, and local laws, ordinances, rules, and regulations which, in any manner, may affect cost, progress, or performance of the Work;
- (b) Contractor has studied carefully all reports, investigations, and tests of subsurface and latent physical conditions at the site which may affect cost, progress, or performance of work and which were relied upon in the preparation of the drawings and specifications;
- (c) Contractor has made or has caused to be made examinations, investigations, tests and studies of reports and related data, in addition to

those referred to in paragraph (b), which Contractor deems necessary for the performance of the Work, determination of the contract price, and completion of the Project within the contract time in accordance with the other terms and conditions of the contract documents. No additional examinations, investigations, tests, reports, or similar data are or will be required by Contractor for such purposes;

- (d) Contractor has reconciled the results of all such observations, examinations, investigations, tests, reports, and data with the terms and conditions of the contract documents;
- (e) Contractor has given the Owner's representative written notice of all conflicts, errors or discrepancies which he has discovered in the contract documents and the written resolution thereof by the Owner's representative is acceptable to the Contractor.

9. Miscellaneous.

- (a) No assignment by a party hereto of any rights under or interests in the contract documents will be binding on another party to this contract without the written consent of the parties sought to be bound; and specifically but without limitation, monies which may become due and monies which are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law) and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the contract documents.
- (b) This Agreement shall be binding upon all parties to the contract and their respective partners, successor, heirs, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the contractual documents.

THIS AGREEMENT is effective on the _____ day of _____, 20__.

OWNER:

CONTRACTOR:

By: _____

By: _____

Address for giving notices:

Address for giving notices:

ATTEST:

ATTEST:

Agent for Service of Process
License # _____

GENERAL CONDITIONS

Section 1. Definitions. Whenever used in these General Conditions or in the other contract documents, the following terms have the meanings indicated which are applicable in both the singular and plural or masculine or feminine thereof:

1. Addenda. Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the contract documents, Drawings and specifications by additions, deletions, clarifications, or corrections.
2. Bid. The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
3. Bonds. Bid, performance and payment bonds and other instruments of security.
4. Change Order. A written order to the Contractor signed by the Owner authorizing an addition, deletion or revision in the Work, or an adjustment in the contract price or the contract time issued after the effective date of the Agreement.
5. Contract Price. The total monies payable to the Contractor under the terms and conditions of the contract documents.
6. Contract Time. The number of calendar days stated in the contract documents for completion of the Work.
7. Contractor. The person, firm, or corporation with whom the Owner has executed the Agreement.
8. Drawings. The part of the contract documents which show the characteristics and scope of the Work to be performed and are referred to in the contract documents.
9. Owner's Representative. That person appointed by the Board of Directors of the Owner to act as the Owner's Representative in all matters relating to this contract.
10. Field Order. A written order issued by the Owner's Representative which orders minor changes in Work not involving an adjustment in the contract price or an extension of the contract time.
11. Substantial Completion. The date certified by the Owner's Representative when the construction of the Project or a specified part thereof is sufficiently completed in accordance with the contract documents so that the Project or a specified part can be utilized for purposes for which it is intended.

12. Subcontractor. An individual, firm, or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the site.
13. Supplier. Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design but who does not perform labor at the site.
14. Work. All labor necessary to produce the construction required by the contract documents and all materials and equipment incorporated or to be incorporated in the Project.
15. Written Notice. Any notice to any party to the Agreement, or relative to any part of this Agreement, in writing is considered delivered and service completed when posted by certified mail or registered mail to the party at the party's last given address as shown on the Agreement, or when delivered in person to the party or the party's authorized representative on the worksite.

Section 2. Preliminary Matters.

1. Delivery of Bonds. When the Contractor delivers the executed Contract Documents to the Owner, Contractor shall also deliver to Owner such bonds as the Contractor may be required to furnish.
2. Copies of Documents. Owner shall furnish to Contractor up to three (3) copies of the contract documents. Additional copies will be furnished upon request at the cost of reproduction.
3. Commencement of Contract Time. The contract time will commence to run on the day indicated in the Notice to Proceed.
4. Insurance. Contractor shall maintain insurance acceptable to Owner in full force and effect throughout the term of this contract. Such insurance shall cover all activities of the contractor arising directly or indirectly out of Contractor's work performed hereunder, including the operations of its subcontractors, if any. Coverages provided by the Contractor must be underwritten by an insurance company deemed acceptable by Owner. Owner reserves the right to reject all or any insurance carrier(s) with an unacceptable financial rating. As evidence of the insurance coverage required by the contract, the Contractor shall furnish a Certificate of Insurance to Owner prior to execution of the contract. Such policies or certificates must be delivered prior to commencement of the work. No contract shall be effective until the required certificates have been received and approved by Owner. The certificate will specify and document all provisions within this contract. A renewal certificate will be sent to the above address 10 days prior to coverage expiration. The procuring of such required insurance shall not be construed to limit Contractor's liability hereunder. Notwithstanding said

insurance, Contractor shall be obligated for the total amount of any damage, injury, or loss caused by negligence or neglect of contractor connected with this contract.

The policy or policies of insurance maintained by the Contractor shall provide at least the following limits and coverages:

(a) Commercial General Liability Insurance. Contractor shall obtain, at contractor's expense, and keep in effect during the term of this contract, Comprehensive General Liability Insurance covering Bodily Injury and Property Damage on an "occurrence" form (1996 ISO or equivalent). This coverage shall include Contractual Liability insurance for the indemnity provided under this contract.

The following insurance will be carried:

Coverage	Limit
• General Aggregate	\$4,000,000
• Each Occurrence	\$2,000,000

(b) Commercial Automobile Insurance. Contractor shall also obtain, at contractor's expense, and keep in effect during the term of the contract, Commercial Automobile Liability coverage including coverage for all owned, hired, and non-owned vehicles. The Combined Single Limit per occurrence shall not be less than \$2,000,000.

(c) Workers' Compensation Insurance. The Contractor, its subcontractors, if any, and all employers providing work, labor or materials under this Contract that are either subject employers under the Oregon Workers' Compensation Law and shall comply with ORS 656.017, which requires them to provide workers' compensation coverage that satisfies Oregon law for all their subject workers or employers that are exempt under ORS 656.126. Out-of-state employers must provide Oregon workers' compensation coverage for their workers who work at a single location within Oregon for more than 30 days in a calendar year. Contractors who perform work without the assistance or labor of any employee need not obtain such coverage. This shall include Employer's Liability Insurance with coverage limits of not less than \$1,000,000 each accident.

(d) The Commercial General Liability Insurance and Commercial Automobile Insurance policies and other policies Owner deems necessary shall include Owner, its officers, directors, employees and volunteers as additional insureds with respect to this contract.

(e) Builder's All Risk Insurance. The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form to cover the course of

construction in the amount of the initial Contract Sum, less costs of clearing, preparation and excavation of the site under this Agreement, plus the value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than Owner has an insurable interest in the property required by this Section to be covered, whichever is later. This insurance shall include interests of Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project. Each loss may be subject to a deductible. Losses up to the deductible amount or otherwise not covered by insurance shall be the responsibility of the Contractor. The policy shall be endorsed to allow complete or partial occupancy by Owner before or after Substantial Completion without the insurer's approval.

5. Owner Insurance. The Owner shall be responsible for purchasing and maintaining its own liability insurance. Owner shall also purchase and maintain property insurance upon the Work at the site to the full insurable value thereof and shall include the interest of the Owner, Contractor and Subcontractors in the Work against the perils of fire and extended coverage. All other risk of loss at the Work site shall be borne by Contractor until acceptance of building by Owner.
6. Subrogation Waiver. Owner and Contractor waive all rights against each other, their agents and any Subcontractors and their agents and employees for damages caused by fire or other perils to the extent covered by insurance provided for in this Section. The Contractor shall require similar written waivers from each Subcontractor and each such waiver shall be in favor of all other parties enumerated in this paragraph.

Section 3. Contract Documents.

1. The contract documents comprise the entire agreement between Owner and Contractor concerning the Work. They may be altered only by written modification, as provided in this Agreement.
2. The contract documents are complementary; what is called for by one is binding as if called for by all. If, during the performance of the Work, Contractor finds a conflict, error or discrepancy in the contract documents, Contractor shall report it to the Owner's Representative in writing at once and before proceeding with the Work affected by the conflict.
3. It is the intent of the specifications and Drawings to describe the complete Project to be constructed in accordance with the contract documents. Any Work which may reasonably be inferred from the specifications or Drawings as being required to produce the intended result shall be supplied whether or not it is specifically

called for. When words which have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such words shall be interpreted in accordance with such meaning. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or to the code of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual or code in effect at the time of the opening of the bid, except as may be otherwise specifically stated. However, no provision of any reference, standard, specification, manual or code shall change the duties and responsibilities of the Owner, Contractor, or any of their agents or employees from those set forth in the contract documents. Clarifications and interpretations of the contract documents shall be issued by the Owner's Representative.

4. Re-use of Documents. Neither Contractor nor any Subcontractor, manufacturer, fabricator, Supplier, or distributor shall have or acquire any title to or ownership rights in any of the Drawings, specifications, or other documents which are a part of this contract. They may not be reused by any party without the express written consent of the Owner and of the preparer of the Drawings.

Section 4. Materials, Service and Facilities.

1. It is understood that, except as otherwise specifically stated in the contract documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, lights, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the Work within the specified time.
2. Materials and equipment shall be stored so as to ensure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.
3. All materials and equipment shall be of good quality and new except as otherwise provided in the contract documents.
4. Equivalent Materials and Equipment. Whenever materials or equipment are specified or described in Drawings or specifications by using the name of proprietary item or the name of a particular manufacturer, fabricator, Supplier or distributor, the name of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other manufacturers, fabricators, Suppliers, or distributors may be accepted by the Owner's Representative if sufficient information is submitted by Contractor to allow the Owner's Representative to determine that the material proposed is equivalent to that named.

5. Contractor shall be fully responsible for all acts and omissions of its Subcontractors and of persons and organizations directly or indirectly employed by Contractor and any Subcontractor and of persons or organizations for whose acts any of them may be liable to the same extent Contractor is responsible for the acts and omissions of persons directly employed by Contractor. Nothing in these documents creates any obligation on the part of the Owner to pay or to see to the payment of any monies due any Subcontractor or other person or organization except as may otherwise be required by law.

Section 5. Fees, Taxes and Permits.

1. Contractor shall pay all applicable royalties and license fees. Contractor shall defend all suits or claims for infringement of any patent rights and save Owner harmless from loss on account thereof.
2. All permits and licenses, required for construction shall be obtained at the expense of Contractor. Owner shall assist the Contractor when necessary in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work and which are applicable at the time of Bid opening. Contractor shall pay all charges of utility service companies for connections to the Work. Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by Contractor in accordance with the laws of the place of the Project.

Section 6. Survey, Permits and Regulations.

1. Owner shall furnish all boundary surveys and establish all base lines for locating principal component parts of the Work together with a suitable number of bench marks adjacent to the Work as shown in the contract documents. From the information provided by Owner, unless otherwise specified in the contract documents, Contractor shall develop and make all detailed surveys needed for construction such as slope stakes, stakes for piling locations, and other working points, lines, elevations and cut sheets.
2. The Contractor shall carefully preserve benchmarks, reference points and stakes and, in case of willful or careless destruction, Contractor shall be charged with the resulting expense and shall be responsible for any mistakes which may be caused by unnecessary loss or disturbance.

Section 7. Protection of Work, Property and Persons.

Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor will take all necessary precautions for the safety of, or provide the necessary protection to prevent injury, damage, or loss, to all employees on the worksite and other persons who may be affected. Contractor shall also be responsible for all safety precautions regarding all

Work and all materials or equipment to be incorporated into the Work, whether in storage on or off the site, and the property at the site or adjacent to it, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designed for removal, relocation, or replacement in the course of construction. Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or any for whose acts any of them may be liable except for acts directly attributable to Owner or Owner's Representative or any person employed by either of them whose acts are not attributable directly or indirectly in whole or in part to the fault or negligence of Contractor.

Section 8. Supervision by Contractor.

The Contractor will supervise and direct the Work. Contractor will be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor will employ and maintain on the Work a qualified supervisor who shall have been designated in writing by Contractor as Contractor's representative at the site. The supervisor shall have full authority to act on behalf of Contractor and all communications given to the supervisor shall be as binding as if given to Contractor. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.

Section 9. Changes in Work.

Owner, at any time the need arises, may order changes in the scope of the Work without invalidating the Agreement. If such changes increase or decrease the amount due under the contract documents, or the time required for performance of the Work, an equitable adjustment shall be authorized by Change Order. Owner or its representative may also, at any time, by issuing a Field Order, make changes in the details of the Work. Contractor shall proceed with the performance of any changes in the Work so ordered, unless Contractor believes that such Field Order entitles Contractor to a change in Contract Price or Contract Time, or both, in which event Contractor shall give Owner's Representative Written Notice of the proposed Change Order within two (2) days after receipt of the Field Order. Contractor shall document in Contractor's notice the basis for the change in Contract Price or Contract Time by separate notice delivered within five (5) days of the date of the Written Notice of the proposed Change Order. Contractor shall not execute such changes pending the receipt of an executed Change Order or further instruction from Owner.

Section 10. Changes in Contract Price.

The Contract Price may be changed only by a written, signed Change Order. The value of any Work covered by a Change Order or of any claim for increase or decrease in the Contract Price shall be determined by one or more of the following methods in the order of precedence listed below:

1. Unit prices previously approved.

2. An agreed lump sum.
3. The actual cost of labor, direct overhead, materials, supplies, and other services necessary to complete the Work plus an amount not to exceed 10% of the actual Work to cover the cost of general overhead profit.

Section 11. Limitation on Liquidated Damages.

Contractor shall not be charged with liquidated damages when the delay in completion of the Work is due to the following and Contractor has promptly given Written Notice of such delay to Owner or its representative:

1. Unforeseeable causes beyond the control and without the fault or negligence of Contractor, including but not restricted to acts of God or of the public enemy, acts of Owner, acts of another Contractor in performance of the contract with the Owner, fires, floods, epidemics, quarantine restriction, strikes, freight embargoes, and abnormal and unforeseen weather; and
2. Any delays of Subcontractors occasioned by any of the causes specified above.

Section 12. Correction of Work.

1. Contractor shall promptly remove from the premises all Work rejected by Owner's Representative for failure to comply with the contract documents, whether incorporated in construction or not, and Contractor shall promptly replace and re execute the Work in accordance with the contract documents and without expense to Owner and shall bear the expense of making good all Work of other contractors destroyed or damaged by such removal or replacement.
2. All removal and replacement Work shall be done at Contractor's expense. If Contractor does not take action to remove rejected Work within five (5) days after receipt of Written Notice of rejection, Owner may remove such Work and store the materials at the expense of Contractor.

Section 13. Subsurface Conditions.

Contractor shall promptly and before such conditions are disturbed, except in the event of an emergency, notify Owner by Written Notice of:

1. Subsurface or latent physical conditions at the site differing materially from those indicated in the contract documents.
2. Unknown physical conditions at the site of an unusual nature, differing markedly from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the contract.

Owner shall promptly investigate the conditions and if found that such conditions do so materially differ and cause an increase or decrease in the cost of or in the time required for performance of the Work, an equitable adjustment shall be made and the contract documents shall be modified by a change order. Any claim of Contractor for adjustment hereunder shall not be allowed unless he has given the required Written Notice.

Section 14. Suspension of Work, Termination Delay.

1. If Contractor is adjudged a bankrupt or insolvent or if Contractor makes a general assignment for the benefit of Contractor's creditors, or if a trustee or receiver is appointed for the Contractor or for any of Contractor's property, or if Contractor files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or applicable laws, or if Contractor repeatedly fails to supply sufficient skilled workmen or suitable material or equipment, or if Contractor repeatedly fails to make prompt payments to Subcontractors for labor, materials, or equipment, or if Contractor disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction of the Work, or if Contractor disregards the authority of Owner's Representative or if Contractor otherwise violates any provision of the contract documents, then Owner may, without prejudice to any other right or remedy, after giving Contractor and Contractor's surety a minimum of five (5) days' Written Notice, terminate the services of the Contractor and take possession of the Project and all materials, equipment, tools, construction equipment, and machinery owned by Contractor and finish the Work by whatever method Owner may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the contract price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to Contractor. If the costs exceed such unpaid balances, Contractor will pay the difference to Owner. Such costs incurred by Owner will be determined by Owner and incorporated in a change order.
2. Where Contractor's services have been terminated under Section 14.1, by Owner, the termination shall not affect any right of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of monies by Owner due Contractor will not release Contractor from compliance with the contract documents.
3. After five (5) days from delivery of Written Notice under Section 14.1 to Contractor, Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the contract. In such case, Contractor shall be paid for all Work executed and any reasonable expense sustained plus reasonable profit for the Work performed.

Section 15. Equal Opportunity.

Contractor agrees to comply with the applicable provisions of the Equal Opportunity Act of 1972 and the Civil Rights Act of 1964 as amended. Contractor shall have the obligation to ensure that the employees and applicants for employment are not discriminated against because of race, creed, color, sex, or national origin.

Section 16. Public Contracting Code Requirements.

1. Contractor shall pay promptly, as due, all persons supplying labor or materials for the prosecution of the Work provided for in the contract, and shall be responsible for such payment of all persons supplying such labor or material to any Subcontractor.
 - (a) ORS 279C.580(3)(a) requires the prime Contractor to include a clause in each subcontract requiring Contractor to pay the first-tier Subcontractor for satisfactory performance under its subcontract within ten (10) days out of such amounts as are paid to the prime Contractor by the public contracting agency; and
 - (b) ORS 279C.580(3)(b) requires the prime Contractor to include a clause in each subcontract requiring Contractor to pay an interest penalty to the first-tier Subcontractor if payment is not made within thirty (30) days after receipt of payment from the public contracting agency.
 - (c) ORS 279C.580(4) requires the prime Contractor to include in every subcontract a requirement that the payment and interest penalty clauses required by ORS 279C.580(3)(a) and (b) be included in every contract between a Subcontractor and a lower-tier Subcontractor or Supplier.
2. Contractor shall promptly pay all contributions or amounts due the Industrial Accident Fund from such Contractor or Subcontractor incurred in the performance of the contract, and shall be responsible that all sums due the State Unemployment Compensation Fund from Contractor or any Subcontractor in connection with the performance of the contract shall promptly be paid.
3. Contractor shall not permit any lien or claim to be filed or prosecuted against the Owner on account of any labor or material furnished and agrees to assume responsibility for satisfaction of any such lien so filed or prosecuted.
4. A notice of claim on Contractor's payment bond shall be submitted only in accordance with ORS 279C.600 and 279C.605.
5. Contractor and any Subcontractor shall pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

6. Contractor shall demonstrate to Owner that an employee drug-testing program is in place within ten (10) days of receiving a Notice of Award.
7. Pursuant to ORS 279C.515, if Contractor fails, neglects or refuses to make prompt payment of any claim for labor or materials furnished to the Contractor or a Subcontractor by any person in connection with the contract as such claim becomes due, the Owner may pay such claim to the persons furnishing the labor or material and charge the amount of payment against funds due or to become due to Contractor by reason of the contract. The payment of a claim in the manner authorized hereby shall not relieve the Contractor or its surety from their obligations with respect to any unpaid claim. If Owner is unable to determine the validity of any claim for labor or material furnished, Owner may withhold from any current payment due Contractor an amount equal to said claim until its validity is determined and the claim, if valid, is paid.
8. Pursuant to ORS 279C.515, if the Contractor or a first-tier Subcontractor fails, neglects, or refuses to make payment to a person furnishing labor or materials in connection with the public contract for a public improvement within 30 days after receipt of payment from Owner or Contractor, the Contractor or first-tier Subcontractor shall owe the person the amount due plus interest charges commencing at the end of the 10 day period that payment is due under ORS 279C.580(4) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest charged to Contractor or first-tier Subcontractor on the amount due shall equal three times the discount rate on 90-day commercial paper in effect at the Federal Reserve Bank in the Federal Reserve District that includes Oregon on the date that is thirty (30) days after the date when payment was received from the public contracting agency or from the Contractor, but the rate of interest shall not exceed thirty (30) percent. The amount of interest may not be waived.
9. As provided in ORS 279C.515, if the Contractor or a Subcontractor fails, neglects, or refuses to make payment to a person furnishing labor or materials in connection with the public contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580.
10. Pursuant to ORS 279C.530, Contractor shall promptly, as due, make payment to any person, co-partnership, association, or corporation, furnishing medical, surgical and hospital care or other needed care and attention, incident to sickness or injury, to employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all monies and sums which the Contractor collected or deducted from the wages of employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service.
11. Contractor shall employ no person for more than ten (10) hours in any one day, or forty (40) hours in any one week, except in cases of necessity, emergency, or

where public policy absolutely requires it, and in such cases, except in cases of contracts for personal services designated under ORS 279A.055, Contractor shall pay the employee at least time and one-half pay for all overtime in excess of eight (8) hours a day or forty (40) hours in any one week when the Work is five (5) consecutive days, Monday through Friday; or for all overtime in excess of ten (10) hours a day or forty (40) hours in any one week when the Work week is 4 consecutive days, Monday through Friday; and for all Work performed on Saturday and on any legal holidays as specified in ORS 279C.540.

12. Pursuant to ORS 279C.540(2), the Contractor must give notice to employees who work on this contract in writing, either at the time of hire or before commencement of Work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and the days per week that the employees may be required to Work.
13. The provisions of ORS 279C.800 to ORS 279C.870 relating to the prevailing wage rates will be complied with.

(a) The hourly rate of wage to be paid by Contractor or any Subcontractor to workers in each trade or occupation required for the public works employed in the performance of this Contract shall not be less than the specified minimum rate of wage in accordance with ORS 279C.838 and ORS 279C.840.

(b) The latest prevailing wage rates for public works contracts in Oregon are contained in the following publications: The January 1, 2021, Prevailing Wage Rates for Public Works Projects in Oregon, including any Amendments. Such publication can be reviewed electronically at:

<https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx>

and are hereby incorporated as part of the contract documents.

(c) Contractor and all Subcontractors shall keep the prevailing wage rates for this Project posted in a conspicuous and accessible place in or about the Project.

(d) The Owner shall pay a fee to the Commissioner of the Oregon Bureau of Labor and Industries as provided in ORS 279C.825. The fee shall be paid to the Commissioner as required by the administrative rules adopted by the Commissioner.

(e) If Contractor or any Subcontractor also provides for or contributes to a health and welfare plan or a pension plan, or both, for its employees on the Project, it shall post notice describing such plans in a conspicuous and accessible place in or about the Project. The notice shall contain information on how and where to make claims and where to obtain future information.

14. Unless exempt under ORS 279C.836(4), (7), (8) or (9), before starting Work on this contract, or any subcontract hereunder, Contractor and all Subcontractors must have on file with the Construction Contractors Board a public works bond with a corporate surety authorized to do business in the State of Oregon in the amount of \$30,000. The bond must provide that the Contractor or Subcontractor will pay claims ordered by the Bureau of Labor and Industries to workers performing labor upon public works projects. The bond must be a continuing obligation, and the surety's liability for the aggregate of claims that may be payable from the bond may not exceed the penal sum of the bond. The bond must remain in effect continuously until depleted by claims paid under ORS 279C.836(2), unless the surety sooner cancels the bond. The surety may cancel the bond by giving thirty (30) days' Written Notice to the Contractor or Subcontractor, to the Construction Contractors Board and to the Bureau of Labor and Industries. When the bond is canceled, the surety is relieved of further liability for Work performed on contracts entered into after the cancellation. The cancellation does not limit the surety's liability for Work performed on contracts entered into before the cancellation. Contractor further certifies that Contractor will include in every subcontract a provision requiring a Subcontractor to file a public works bond with the Construction Contractors Board before starting Work on the Project, unless exempt under ORS 279C.836(4), (7), (8), or (9).
 - (a) Unless exempt under ORS 279C.836(4), (7), (8), or (9), before permitting a Subcontractor to start Work on this public works project, the Contractor shall verify that the Subcontractor has filed a public works bond as required under this section or has elected not to file a public works bond under ORS 279C.836(7).
 - (b) Unless the Owner has been notified of any applicable exemptions under ORS 279C.836(4), (7), (8), or (9), the public works bond requirement above is in addition to any other bond Contractor or Subcontractors may be required to obtain under this contract.
15. As may be required by ORS 279C.845, Contractor or Contractor's surety and every Subcontractor or Subcontractor's surety shall file certified payroll statements with the Owner in writing.
 - (a) If Contractor is required to file certified statements under ORS 279C.845, the Owner shall retain twenty-five (25) percent of any amount earned by the Contractor on the public works project until the Contractor has filed with the Owner a certified statement as required by ORS 279C.845. The Owner shall pay the Contractor the amount retained within 14 days after the Contractor files the required certified statements, regardless of whether a Subcontractor has failed to file certified statements required by statute. The Owner is not required to verify the truth of the contents of certified statements filed by the Contractor under this section and ORS 279C.845.

- (b) The Contractor shall retain twenty-five (25) percent of any amount earned by a first-tier Subcontractor on this public works contract until the Subcontractor has filed with the Owner certified statements as required by ORS 279C.845. The Contractor shall verify that the first-tier Subcontractor has filed the certified statements before the Contractor may pay the Subcontractor any amount retained. The Contractor shall pay the first-tier Subcontractor the amount retained within fourteen (14) days after the Subcontractor files the certified statements as required by ORS 279C.845. Neither the Owner nor the Contractor is required to verify the truth of the contents of certified statements filed by a first-tier Subcontractor.
16. All employers, including Contractor, that employ subject workers who Work under this contract shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its Subcontractors complies with these requirements.
 17. All sums due the State Unemployment Compensation Fund from the Contractor or any Subcontractor in connection with the performance of the contract shall be promptly so paid.
 18. The contract may be canceled at the election of Owner for any willful failure on the part of Contractor to faithfully perform the contract according to its terms.
 19. Contractor certifies that it has not and will not discriminate against minorities, women or emerging small business enterprises in obtaining any required Subcontractors, or against a business enterprise that is owned or controlled by, or that employs a disabled veteran as defined in ORS 408.225.
 20. Contractor certifies its compliance with the Oregon tax laws, in accordance with ORS 305.385.
 21. In the performance of this contract, the Contractor shall use, to the maximum extent economically feasible, recycled paper, materials, and supplies, and shall compost or mulch yard waste material at an approved site, if feasible and cost effective.
 22. As may be applicable, Contractor certifies that all Subcontractors performing construction Work under this contract will be registered with the Construction Contractors Board or licensed by the state Landscaping Contractors Board in accordance with ORS 701.035 to ORS 701.055 before the Subcontractors commence Work under this contract.
 23. Pursuant to District Rule 137-049-0880, the Owner may, at reasonable times and places, have access to and an opportunity to inspect, examine, copy, and audit the records relating to the Contract.

24. Pursuant to ORS 279C.510, if feasible and cost-effective and contract is for demolition, Contractor shall salvage or recycle construction and demolition debris.
25. Pursuant to ORS 279C.510, if feasible and cost-effective and contract is for lawn and landscape maintenance, Contractor shall compost or mulch yard waste material at an approved site.
26. In compliance with the provisions of ORS 279C.525, the following is a list of federal, state and local agencies, of which the Owner has knowledge, that have enacted ordinances or regulations dealing with the prevention of environmental pollution and the preservation of natural resources that may affect the performance of the contract:

FEDERAL AGENCIES:

- Agriculture, Department of
 - Forest Service
 - Soil Conservation Service
- Defense, Department of
 - Army Corps of Engineers
- Environmental Protection Agency
- Interior, Department of
 - Bureau of Sport Fisheries and Wildlife
 - Bureau of Outdoor Recreation
 - Bureau of Land Management
 - Bureau of Indian Affairs
 - Bureau of Reclamation
- Labor, Department of
 - Occupational Safety and Health Administration
- Transportation, Department of
 - Federal Highway Administration
- Homeland Security, Department of
 - Coast Guard

STATE AGENCIES:

- Agriculture, Department of
- Environmental Quality, Department of
- Fish and Wildlife, Department of
- Forestry, Department of
- Geology and Mineral Industries, Department of
- Human Resources, Department of
- Land Conservation and Development Commission
- Soil and Water Conservation Commission

- State Engineer
- State Land Board
- Water Resources Board

LOCAL AGENCIES:

- City Council
- County Court
- County Commissioners, Board of
- Port Districts
- Metropolitan Service Districts
- County Service Districts
- Sanitary Districts
- Water Districts
- Fire Protection Districts

27. Once before the first payment and once before final payment is made of any sum due on account of the contract for a public work, Contractor or Contractor's surety and every Subcontractor with a Subcontractor's surety, shall file a statement with Owner in writing in the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each classification of worker which Contractor or Subcontractor has employed upon such public work, and further certifying that no worker employed upon such public work has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the contract, which certificate and statement shall be verified by the oath of Contractor or Contractor's surety or Subcontractor or the Subcontractor's surety, that Contractor or Subcontractor has read such statement and certificate, knows the contents thereof, and that the same is true to Contractor's or Subcontractor's knowledge. A true copy of the certification or certifications required to be filed pursuant to this section shall also be filed at the same time with the Commissioner of the Bureau of Labor and Industries.

28. The following notice is applicable to Work involving excavation. "ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center at (503) 232-1987."

Section 17. Warranty and Guarantee.

1. Contractor warrants and guarantees to Owner that all Work will be done in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to Contractor. All defective Work, whether or not in place, may be rejected, corrected or accepted. Contractor understands that the City of Sheridan and Yamhill County and their various departments, and

agencies, must be consulted and be allowed to inspect the Work and sign off in each particular area. At all times Owner's Representative and appropriate inspectors shall have access to the Work for inspection and testing. Contractor shall provide proper and safe conditions for such access.

2. Where any law, ordinance, rule, regulation, code, or other order of any public body having jurisdiction requires any Work or part thereof to specifically inspected, tested or approved, Contractor shall assume full responsibility for such inspection, testing, or approval, and pay all costs in connection therewith and furnish Owner's Representative with the required certificates of inspection, testing or approval. If any Work to be inspected, tested, or approved is covered without written concurrence of Owner's Representative, it must be, if requested, uncovered for observation. Such uncovering shall be at Contractor's expense.
3. Neither observations by the Owner's Representative nor inspection tests or approvals by others shall relieve the Contractor from his obligations to perform the Work in accordance with the contract documents.
4. If, within two (2) years after the date of final completion and sign off and payment of any retainage by Owner to Contractor, there is any defect in materials or workmanship, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work or, if it has been rejected by Owner, remove it from the site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where a delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced. All direct or indirect costs of such removal or replacement, including compensation for additional professional services, shall be paid by Contractor. Such additional professional services include the services of any attorney employed by Owner to assist it in dealings with Contractor. If Contractor does not pay for such Work, or does not ensure that such Work is performed as required by this section, Owner may pursue reimbursement from Contractor, including pursuing a claim upon Contractor's bond, if applicable, for payment of such Work. All notices sent to Contractor shall have copies sent to Contractor's surety.
5. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by the application for payment, whether incorporated in the Project or not, will pass to Owner at the time of payment, free and clear of all liens, claims, security interests and encumbrances of any party whomsoever.

Section 18. Bond Form.

Payment and Performance Bonds shall be in the form provided within the Invitation to Bid packet. Bid Bonds shall be in the standard form of the issuing company. If a standard form is not available, the AIA Form A-310 shall be acceptable for the Bid Bond.

Section 19. Payments to Contractor.

1. By the 5th day of each month, Contractor will submit to Owner's Representative a partial payment estimate filled out and signed by Contractor covering the Work performed during the period covered by the partial payment estimate and supported by such data as Owner's Representative may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to Owner, as will establish Owner's title to the material and equipment, and protect its interest therein, including applicable insurance. Owner's Representative will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to Owner, or return the partial payment estimate to Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, Contractor may make the necessary corrections and resubmit the partial payment estimate. Owner will, within ten (10) days of the next Board meeting after presentation by Owner's Representative of an approved partial payment estimate, pay Contractor a progress payment on the basis of the approved partial payment estimate. Owner shall retain five percent (5%) of the amount of each payment until final completion and acceptance of all Work covered by the contract documents. After fifty percent (50%) of the Work has been completed, Owner may, at Owner's sole discretion, reduce or eliminate retainage on the remaining progress estimates. When the Work is substantially complete, Owner may, at Owner's sole discretion, further reduce the retained amount below 5% to only that amount necessary to assure completion. On completion and acceptance of a part of the Work on which the price is stated separately in the contract documents, Owner may, in Owner's sole discretion, pay for that part of the Work in full, including retained percentages, less authorized deductions.
2. A request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.
3. Prior to Substantial Completion, Owner, with the approval of Owner's Representative and with the concurrence of the Contractor, may use any completed or substantially completed portions of the Work. Such use shall not constitute an acceptance of such portions of the Work.
4. Owner shall have the right to enter the premises for the purpose of doing Work not covered by the contract documents. This provision shall not be construed as relieving Contractor of the sole responsibility for the care and protection of the Work, or the restoration of any damaged Work except such as may be caused by agents or employees of Owner. Such entry or Work shall only be allowed to the extent it does not interfere with Contractor's Work.

5. Upon completion and acceptance of the Work, Owner's Representative shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the contract documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by Owner, shall be paid to the Contractor within thirty (30) days of the issuance of the certificate of completion and acceptance of the Work.
6. Contractor will indemnify and save Owner and Owner's officials, employees, agents, and volunteers harmless from all claims arising out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers or machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the Work. Contractor shall, at Owner's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged or waived. If Contractor fails to do so, Owner may, after having notified Contractor, either pay unpaid bills or withhold from Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to Contractor shall be resumed in accordance with the terms of the contract documents, but in no event shall the provisions of this Section be construed to impose any obligations upon Owner to either Contractor, Contractor's surety or any third party. In paying any unpaid bills of Contractor, any payment so made by Owner shall be considered as a payment made under the contract documents by Owner to Contractor and Owner shall not be liable to Contractor for any such payments made in good faith.
7. If Owner fails to make payment thirty (30) days after approval of a partial payment estimate by Owner's Representative, in addition to the other remedies available to Contractor, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

Section 20. Cleanup.

1. From time to time as the Work progresses and immediately after completion of the Work, Contractor shall clean up and remove all refuse and unused materials of any kind resulting from the Work. Upon failure of Contractor to do so within 24 hours after being so directed by Owner's Representative, the Work may be done by Owner and the cost thereof may be deducted from any payment due Contractor.
2. After all other Work embraced in the contract is completed and before final acceptance of the contract, the entire right of way and driveways, alleys, and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections shown in the specifications.

3. As a condition precedent to final acceptance of the Project, Contractor shall remove all equipment and temporary structures, and all rubbish, waste and generally clean the right of way and premises.

Section 21. Use of Light, Power and Water.

Contractor shall furnish temporary light, power, and water complete with connecting piping, wiring, lamps, and similar equipment necessary before the Work is improved. Contractor shall install, maintain and remove temporary lines upon completion of Work. Contractor shall obtain all permits and bear all costs for connection with temporary services and facilities at no expense to Owner.

Section 22. Arbitration.

1. All claims, disputes, and other matters in question between Owner and Contractor arising out of, or relating to, the contract documents, including rescission, reformation, enforcement, or the breach of the terms thereof, except for claims which may have been waived by the making or acceptance of final payment or for acquisition of property subject to eminent domain, may be decided by arbitration. Owner shall have the sole discretion as to whether or not a dispute will be decided by arbitration conducted in Yamhill County, Oregon, rather than through the court process.
2. No demand for arbitration of any claimed dispute or other matter shall be effective until after a claim or demand regarding the underlying dispute is made to the District's Board and the Board at its next regularly scheduled meeting, has rendered a written decision with respect thereto denying the claim or demand. No demand for arbitration of the denial of any such claim, dispute, or other matter shall be made later than thirty (30) days after the date on which the Board of Directors has rendered a written decision denying the claim. The failure to demand arbitration within thirty (30) days of the date of the Board of Director's decision denying the claim shall result in the Board of Director's decision being binding upon Owner and Contractor.
3. Notice of demand for arbitration shall be filed in writing with the other party to the agreement. The demand for arbitration shall be made within the 30 day period specified above. Owner, if not the party demanding arbitration, has the option of allowing the matter to proceed with arbitration or by Written Notice within five (5) days after receipt of a demand for arbitration, or rejecting arbitration and requiring Contractor to proceed through the courts for relief. Arbitration shall be conducted under the Uniform Arbitration Act, ORS 36.600 *et seq.* If the parties are unable to mutually select an arbitrator within twenty (20) days following Owner's decision to pursue arbitration, then each party shall select an arbitrator, and the two arbitrators shall select a single arbitrator. The arbitrator(s) shall have substantial experience in construction disputes. The parties agree that any award rendered by the arbitrator will be final, and judgment may be entered upon

the award in any court having jurisdiction thereof, and will not be subject to modification or appeal except to the extent permitted by Oregon law.

Section 23. Attorney Fees.

If suit, action or arbitration is brought either directly or indirectly to rescind or enforce the terms of this agreement, the prevailing party shall recover and the losing party hereby agrees to pay reasonable attorney's fees incurred in such proceeding, in both the trial and appellate courts, as well as any costs and disbursements. Further, if it becomes necessary for Owner to incur the services of an attorney to enforce any provision of this agreement without initiating litigation, Contractor agrees to pay Owner's attorney's fees so incurred. Such costs and fees shall bear interest at the maximum legal rate from the date incurred, until the date paid by losing party.

SPECIFICATIONS

F:\1Clients\Muni\Sheridan FD\Public Contracting\Seismic Upgrades (3)\Construction\ITB - Invitation to Bid Packet - (031621) CHCkad.docx

1 PROJECT DESCRIPTION
2 In general, the project comprises a seismic upgrade of an existing fire station.
3
4 CONTRACT
5 In event work described herein is awarded, successful Bidder and Owner shall execute the following
6 Contract:
7 Agreement in Invitation to Bid document.
8
9 WORK FURNISHED AND INSTALLED BY OWNER
10 Concurrently with Work of this Contract:
11 None.
12
13 PRODUCTS FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR, IF ANY
14 Delivery:
15 By Owner.
16 Unloading:
17 By Owner.
18 Owner's Duties:
19 Arrange for and deliver necessary shop drawings.
20 Deliver product to site in accordance with approved construction schedule.
21 Inspect deliveries jointly with Contractor.
22 Submit claims for transportation damage.
23 Arrange for replacement of damaged, defective, missing, or otherwise unacceptable Items.
24 Arrange for manufacturer's required warranties, bond, service, and inspections.
25 Contractor's Duties:
26 Designate required delivery date for each Owner-furnished product.
27 Review any shop drawings, samples, and product data, and notify Architect about any anticipated
28 discrepancies or problems.
29 Promptly inspect delivered products, and report any damage, defective items, or missing items.
30 Handle at site, including uncrating and storing.
31 Protect products against damage and discoloration.
32 Install, connect, adjust, and where scheduled, finish products.
33 Clean, repair and touch-up, or replace when directed, products including those of other sections which
34 have been soiled, discolored, or damaged by this work.
35
36 OWNER'S PROJECT REPRESENTATIVE
37 The Owner's representative during the project will be:
38 Fred Hertel, Fire Chief
39 Southwestern Polk County Rural Fire Protection District
40 230 SW Mill Street
41 Sheridan, OR 97378
42 (503) 843-2467
43 Allow access by the Project Representative to the project at all times.
44 Coordinate scheduling, personnel access, and equipment access to the building with the Project
45 Representative.
46 Owner's Project Representative will provide contract administration services throughout project
47 construction. All communications to the Owner shall be through the Owner's Project Representative.
48 Contractor may be asked to cease daytime work and to reschedule if it is found to interfere with the
49 Owner's operations.
50
51 CONSTRUCTION TIME
52 See Bid Form in Invitation to Bid document.
53
54 CONTRACTOR USE OF PREMISES
55 See Site Plan on Drawings for access to building area. Do not use other areas around building without
56 approval from Owner's Project Representative.
57
58 GRADE LINES AND LEVELS
59 Contractor shall verify all setbacks, grades, and levels; and stay within the limits thereof.

1 PROTECTION OF PUBLIC
2 Provide barriers around equipment located on the ground.
3 Provide warning signs where necessary to alert pedestrians and vehicle operators to potential hazards.

4
5 PROTECTION OF PROPERTY
6 Protect existing building, building contents, trees, shrubs, planting beds, pavement and other exterior
7 areas from damage.
8 Protect building occupants, pedestrians, building, and building contents from damage due to work of this
9 project.
10 Replace damaged property, where directed, at no additional cost to Owner.
11 Owner shall deduct the value of any damage from amount owed Contractor, or at Owner's option,
12 Contractor may pay for repair or replacement directly.

13
14 PROTECTING EXISTING UTILITIES
15 Drawings indicate approximate location of any known, concealed utility lines. Before starting work,
16 Contractor shall determine exact location of any of these lines that could be damaged by contract work.
17 Contractor shall assume that other, unknown utility lines do exist, and Contractor shall proceed with
18 caution when working in areas that could conceal unknown utilities. If such utility lines are encountered,
19 immediately request disposition instructions from Architect.
20 If utility lines are damaged; remove, repair or replace lines as directed. Additional compensation and/or
21 extensions of time, if any, caused by removing, repairing, or replacing lines will be determined in
22 accordance with the General Conditions.

23
24 PROJECT COORDINATION
25 General Contractor is responsible for overall coordination of trades. Mechanical and electrical contractors
26 are responsible for coordinating with each other and making provisions in their work for the other's trade.

27
28 CODES
29 All work shall be in compliance with current state and local codes. General Contractor shall make
30 available to all Sub-contractors, all reports and requirements issued by the building permit or subsequent
31 inspections by the building officials.

32
33 PERMITS AND FEES
34 The Owner will pay the plan review fee, general building permit fee and systems development charges.
35 The Contractor shall pay all other permit and use fees including, but not limited to: Specialty contractor
36 fees and permit costs; public works fees and permits; plumbing, mechanical, electrical and related permits
37 and fees; business license fees; permits and fees for work in public rights-of-way, temporary work, street
38 closures, and utility taps. The Contractor shall be responsible for violations of law for any cause in
39 connection with the completion of the work. The Contractor shall be responsible for obstruction or
40 damage to streets, sidewalks, utilities and other public or private improvements done in connection with
41 completion of the work. Conform to applicable state, city and local codes and ordinances.

42
43 UNACCEPTABLE EXISTING CONDITIONS
44 Exposed to View:
45 Repair or replace as part of this work.
46 No additional payment by Owner will be made.
47 Concealed:
48 Repair or replace where necessary.
49 Upon notification from Contractor, Owner will issue change order authorizing Contractor to perform this
50 work and contract sum will be adjusted accordingly.

51
52
53 END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Contractor's requirements in the selection of products, manufacturers and procedures for consideration of
5 proposal substitutions.

6
7 **QUALIFICATIONS**

8 Architect will be sole judge of acceptability of any proposed substitution. Only approved substitutions
9 may be used on contract work.

10 Each request for substitution approval shall include:

- 11 Identity of product for which substitution is requested; include Specification page number.
- 12 Identity of substitution; include product description, drawings, photographs, performance and test
- 13 data, and any other information necessary for evaluation.
- 14 Quality comparison of proposed substitution with specified product.
- 15 Changes required in other work because of substitution.
- 16 Effect on construction Progress Schedule.
- 17 Cost comparison of proposed substitution with specified product.
- 18 Any required license fees or royalties.
- 19 Availability of maintenance service.
- 20 Source of replacement materials.

21
22 **SUBSTITUTIONS DURING BID PERIOD**

23 No request for substitution approval will be considered unless written request in triplicate has been
24 submitted on standard form bound herein, and has been received by Architect by 5:00 PM at least 10
25 calendar days prior to bid opening day.

26 Request submitted without self-addressed and stamped envelope will not be individually acknowledged.
27 Architect will issue Addenda prior to bid opening listing all approved substitutions.

28
29 **SUBSTITUTIONS AFTER CONTRACT AWARD**

30 No request for substitution approval will be considered unless written request in triplicate has been
31 submitted on standard form bound herein.

32 Approval will be granted only when:

- 33 Specified product cannot be delivered without project delay.
- 34 Specified product has been discontinued.
- 35 Specified product has been replaced by superior product.
- 36 Specified product cannot be guaranteed as specified.
- 37 Specified product will not perform properly.
- 38 Specified product will not fit within designated space.
- 39 Specified product does not comply with governing codes or regulations.
- 40 Substitution will be clearly in Owner's interest.

41 Architect will issue Change Order authorizing approved substitutions and revising Contract Sum where
42 appropriate.

43
44
45 **END OF SECTION**

SUBSTITUTION REQUEST

TO:

PROJECT:

SPECIFIED ITEM:

Section	Page	Paragraph	Description
---------	------	-----------	-------------

PROPOSED SUBSTITUTION:

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of request including identification of applicable data portions.

Attached data also includes description of changes to Contract Documents and proposed substitution requires for proper installation.

Undersigned certifies following items, unless modified by attachments, are correct:

1. Proposed substitution does not affect dimensions shown on drawings.
2. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.
3. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.
4. Maintenance and service parts available locally or readily obtainable for proposed substitution.
- 5.

Undersigned further certifies function, appearance, and quality of proposed substitution are equivalent or superior to specified item.

Undersigned agrees, if this page is reproduced, terms and conditions for substitutions found in Bidding Documents apply to this proposed substitution.

Submitted by:

Name (Printed or typed)

Signature

Firm Name

Address

City, State, Zip

Date

Tel: Fax:

General Contractor (if after award of Contract)

For use by A/E	
<input type="checkbox"/> Approved	<input type="checkbox"/> Approved as noted
<input type="checkbox"/> Not Approved	<input type="checkbox"/> Received too late
By _____	
Date _____	
Remarks _____	

July 1999
The Construction Specifications Institute
Northwest Region

Owner (if after award of Contract)
Date _____



1 SECTION INCLUDES
2 Pre-construction meeting, pre-installation conferences, progress meetings, and Requests for Information.
3
4 **PRE-CONSTRUCTION MEETING**
5 Meeting Requirements:
6 Owner, Architect, Contractor schedule date and time for a Preconstruction Site Meeting as soon as
7 possible after Contractor receives signed contract or Notice to Proceed.
8 Attendees:
9 Contractor, Subcontractors, Suppliers, and Consultants deemed necessary by Architect and Contractor.
10 Agenda:
11 Schedule Progress Meetings.
12 Discuss lines of communication and methods on how to reduce possible miscommunications between
13 parties involved. Reach conclusions and abide by them. Maintain communication and cooperation.
14 Discuss hazardous materials.
15 Review list of subcontractors and suppliers.
16 Discuss Construction Progress Schedule and agree on date of publication.
17 Discuss critical scheduling requirements.
18 Discuss Contractor requirements.
19 Discuss Design-Build requirements if applicable.
20 Discuss procedures for Contractor's RFIs. Requirements as follows:
21 Contact Architect for items apparently requiring immediate attention.
22 If Contractor requires additional information, clarification, unforeseen conditions are encountered
23 or suggestions for betterment of project, document apparent item, provide a due date and
24 indicate whether additional time/cost or savings are involved and submit RFI on form at end of
25 this Section. Prepare each RFI for a single subject matter.
26 Record each RFI in a Log, identifying each RFI by number, subject, date submitted, date of
27 response and disposition.
28 Contractor may prepare RFI by copying or scanning form at end of this Section. Number each
29 RFI numerically and record in log. Architect answers RFIs in a timely manner by written response
30 on submitted RFI. If Change Order is indicated change order request prepared and forwarded to
31 Contractor.
32 Design Clarification/Verification Request (DCVR) or other forms are unacceptable.
33 Review procedures for processing shop drawings, product data, samples, field decisions, and change
34 orders.
35 Review procedures for maintaining project record documents, security, deliveries, safety, housekeeping,
36 and first aid.
37 Discuss procedures of work forces and working relations with Owner's staff and others.
38 Review use of site for parking, staging, temporary buildings and construction activities.
39 Schedule future meeting dates and times.
40
41 **PRE-INSTALLATION CONFERENCES**
42 Meeting Requirements:
43 Conduct Pre-installation Conference before each activity that requires coordination with other
44 construction activities.
45 See each Specification Sections to verify if a pre-installation conference is required.
46 Attendees:
47 Architect, Contractor, Subcontractor(s) involved, manufacturer's representative if required by
48 manufacturer and/or specifications. Code enforcement personnel if required by local codes.
49 Agenda:
50 Review progress of other activities and preparations for activity under consideration, including time
51 schedules, manufacturer's preparation and installation recommendations, safety requirements, weather
52 limitations, substrate acceptability, compatibility problems, and inspection and testing requirements.
53 Contractor conducts and records significant discussions, agreements and disagreements of each
54 conference. It is recommended that this meeting be held before or after Progress Meeting.
55 Number and record meetings sequentially. Distribute meeting record to concerned parties including
56 Architect and Owner within 72 hours after meeting.
57
58
59

PROJECT MEETINGS

01 31 19-2

- 1 PROGRESS MEETINGS
- 2 Meeting Requirements:
- 3 Contractor conducts Progress Meetings at regularly scheduled intervals as determined.
- 4 Contractor prepares agenda and provides meeting minutes.
- 5 Weekly meetings, or as scheduled, conducted at jobsite.
- 6 Attendees:
- 7 Owner, Architect, Contractor, Consultants and Subcontractors deemed necessary by Architect and
- 8 Contractor.
- 9 Agenda:
- 10 Review construction progress schedule.
- 11 Review last Meeting Minutes for accuracy. Correct items if needed.
- 12 Discuss old business and new business agenda items.
- 13 Review RFI log, ASI log, change order requests, and submittal log for current status.
- 14 Contractor distributes written minutes of each meeting to concerned parties, as determined, within 72
- 15 hours.
- 16
- 17
- 18

END OF SECTION

1 **REQUEST FOR INFORMATION**

2
3 **CARLSON VEIT JUNGE ARCHITECTS P.C.**
4 3095 River Road North
5 Salem, Oregon 97303
6 503 390-0281
7 FAX 503 390-2459

RFI NO.: _____

DATE: _____

8
9 CONTRACTOR'S PROJECT NO.: _____

10
11 PROJECT: Sheridan Fire Station
12 Seismic Upgrade

13
14 OWNER: Sheridan Fire District

15
16
17 ARCHITECT'S PROJECT NO.: 00419

18
19 TO: _____

20
21 INITIATED BY: _____

22
23 QUESTION: _____

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40 Potential Cost Impact: _____

41
42 Potential Time Impact: _____

43
44 Response needed within _____ days

45
46 RESPONSE: _____

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58

59
60 Signature: _____ Date: _____

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Submit shop drawings, product data, and samples required by Contract Documents.

5
6 **DEFINITIONS**

7 Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for
8 representing documents in a device-independent and display resolution-independent fixed-layout
9 document format.

10 File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another
11 computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a
12 portion of a network located outside of network firewalls within which internal and external users are able
13 to access files.

14 Action Submittals: Written and graphic information and physical samples that require the Architect's
15 responsive action. Action submittals are those submittals indicated in individual specification sections as
16 action submittals.

17 Informational Submittals: Written and graphic information and physical samples that do not require the
18 Design Professional's responsive action. Submittals may be rejected for not complying with
19 requirements. Informational submittals are those submittals indicated in individual specification sections
20 as informational submittals.

21
22 **SPECIAL REQUIREMENTS**

23 **General:**

24 Shop Drawings and Product Data shall be forwarded as electronic submittals in the form of PDF files.
25 Electronic files may be forwarded by e-mail, or by interactive website services such as an FTP site
26 established by the Contractor or the Contractors Project Information Management (PIM) software.
27 The electronic submittal process is not intended for color samples, color charts, or physical material
28 samples.

29 Commissioning Authority will review submittals applicable to systems being commissioned for compliance
30 with commissioning needs, concurrent with the Architect's review and approval.

31 Submit all submittal items required for each Specification Section concurrently unless partial submittals
32 for portions of the Work are indicated on approved submittal schedule.

33 **Submittal Schedule:**

34 Designate in Construction Schedule, or in separate coordinated schedule, submission dates and dates
35 that reviewed Shop Drawings, Product Data and Samples will be needed.

36 **Shop Drawings:**

37 Identify Shop Drawing details by reference to drawing sheet, detail, schedule, or room number shown on
38 contract drawings.

39 Provide coordinated three-dimensional shop drawings for submittals. If drawings are not submitted as
40 three-dimensional, provide detailed two-dimensional drawings. Refer to Sections 22 05 00 and 23 05 00
41 for additional requirements for mechanical work and Sections 26 05 00, 27 05 00 and 28 05 00 for
42 additional requirements for electrical work.

43 Paper Copies: Sheet Size 8 1/2 X 11 inch, or folded to that size to facilitate filing.

44 **Product Data:**

45 Clearly mark each copy to identify pertinent products.

46 Show performance characteristics and capacities.

47 Show dimensions and required clearance.

48 Show wiring and piping diagrams, and controls.

49 Manufacturer's standard schematic drawings and diagrams:

50 Modify to delete information not applicable to work.

51 Supplement standard information to provide information specifically applicable to work.

52 **Samples:**

53 Size and quantity: See respective specification sections.

54 Show full range of color, texture, and pattern.

55 Deliver to Architect's office, unless otherwise specified.

56 **Costs:**

57 Cost of the project interactive website services shall be included in the Contractor's bid.

58 If using an FTP website or PIM software, Contractor shall provide training for Owner's representatives,
59 Architect, and Architect's consultants, regarding use of website or PIM software.

1 Internet Service and Equipment Requirements:
2 Email address and Internet access at Contractor's main office.
3 Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar
4 PDF review software for applying electronic stamps and comments. As an option, the project's
5 interactive website provider shall provide free of charge to any party requesting it, a free
6 downloadable PDF review software from their website.
7

8 **CONTRACTOR'S RESPONSIBILITIES**

9 Review Shop Drawings, Product Data, and Samples prior to submission.
10 Determine and verify:
11 Field measurements.
12 Field construction criteria.
13 Catalog numbers and similar data.
14 Conformance with specifications.
15 Comply with Contract Documents.
16 Coordinate each submittal with requirements of work.
17 Notify Architect in writing, at submission time, of any deviations in submittals from Contract Document
18 requirements.
19 Contractor is responsible for providing submittals in one complete package. If submittals are not provided
20 in one complete package, provide a list of items that will be included in a follow-up deferred submittal.
21 Perform no work or fabrication requiring submittal until Architect approves submittal.
22

23 **SUBMISSION REQUIREMENTS**

24 Make submittals promptly in accordance with approved Progress Schedule, and in such sequence as to
25 cause no work delay.

26 Shop Drawings:

27 Submittal shall contain:
28 Project title and names of Contractor, Supplier, and Manufacturer.
29 Project identification complete with specification section number.
30 Field measurements, clearly identified as such.
31 Relation to critical features and adjacent work.
32 Applicable standards, such as ASTM or Federal Specifications numbers.
33 Identification of deviations from Contract Documents.
34 Identification of resubmittal revisions.
35 At least 6 X 8 inch space on each page for Contractor's and Architect's stamps.
36 Contractor's stamp, signed and certifying that products, field measurements, field construction
37 criteria, and information submitted has been reviewed and accepted by him as accurate and
38 conforming with Contract Documents.

39 Product Data:

40 Submittal shall contain:
41 Project title and names of Contractor, Supplier, and Manufacturer.
42 Project identification complete with specification section number.
43 Applicable standards, such as ASTM or Federal Specifications numbers.
44 Identification of deviations from Contract Documents.
45 Identification of resubmittal revisions.
46 At least 6 X 8 inch space on the first page for Contractor's and Architect's stamps.
47 Contractor's stamp, signed and certifying that products and information submitted has been reviewed and
48 accepted by him as accurate and conforming with Contract Documents.

49 Samples:

50 Submit number stated in respective specification section.
51 Submittal shall contain:
52 Project title and names of Contractor, Supplier, and Manufacturer.
53 Project identification complete with specification section number.
54 Field measurements, clearly identified as such.
55 Relation to critical features and adjacent work.
56 Applicable standards, such as ASTM or Federal Specifications numbers.
57 Identification of deviations from Contract Documents.
58 Identification of resubmittal revisions.
59 At least 6 X 8 inch space on each page for Contractor's and Architect's stamps.

1 Contractor's stamp, signed and certifying that products, field measurements, field construction
2 criteria, and information submitted has been reviewed and accepted by him as accurate and
3 conforming with Contract Documents.
4

5 **RESUBMISSION REQUIREMENTS**

6 Make any corrections or changes in submittals required by Architect and resubmit until approved.

7 Shop Drawings and Product Data:

8 Revise initial drawings or data, and resubmit as specified for initial submittal.

9 Identify any changes made other than those requested by Architect.

10 Samples:

11 Submit new samples as required for initial submittal.
12

13 **ARCHITECT'S RESPONSIBILITIES**

14 Review submittals with reasonable promptness.

15 Affix signature, and indicate approval or requirements for resubmittal.

16 Return submittals to Contractor for distribution, or resubmission.
17

18 **REQUIRED SUBMITTALS**

19 Refer to individual sections in this Project Manual.
20

21 **DEFERRED SUBMITTALS**

22 As required in other specification sections, submit to the Authority Having Jurisdiction (AHJ) shop
23 drawings and design professional's engineering calculations as required by the AHJ for those products
24 required to be bidder designed based on performance criteria noted.

25 Submit the number of paper copies required by the AHJ. Upon receiving approval by the AHJ, make
26 submittal to the Architect for his review and approval. Obtain Architect's approval before fabricating work.
27

28 **SUBMITTAL ADMINISTRATIVE REQUIREMENTS**

29 Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings may be
30 provided by Architect for Contractor's use in preparing submittals, subject to execution of an AIA E201 –
31 2007 Digital Data Protocol Exhibit and the Architect's Digital File Disclaimer/Waiver Form.
32
33

34 **END OF SECTION**

- 1 REFERENCED SPECIFICATIONS AND STANDARDS
 2 For products or workmanship specified by Referenced Specification or Standard, comply with
 3 requirements of the Specification or Standard, except when more rigid requirements are specified or are
 4 required by governing codes.
 5 Except where a specific date is specified, the date of Referenced Specification or Standard is that in
 6 effect as of the date of Owner-Contractor Agreement.
 7 Obtain a copy of all Referenced Specifications and Standards, and maintain at jobsite during the specific
 8 work until Substantial Completion of the Project.
 9 Wherever referenced Standard Specifications or Standards issued by manufacturers or other similar
 10 organizations contain provisions which conflict with the Contract Documents the Contract Documents
 11 shall govern.
 12
- 13 REFERENCED REGULATORY AGENCIES
- 14 ADAAG Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and
 15 Facilities
 16 Office on the Americans with Disabilities Act
 17 Civil Rights Division
 18 U.S. Department of Justice
 19 Washington, D.C. 20530
 20 www.access-board.gov
 21
- 22 AASHTO American Association of State Highway and Transportation Officials
 23 444 North Capital Street, NW
 24 Washington, D.C 20001
 25 www.aashto.org
 26
- 27 ANSI American National Standards Institute
 28 1430 Broadway
 29 New York, NY 10018
 30 www.ansi.org
 31
- 32 ASHRAE American Society of Heating, Refrigeration and Air-Conditioning Engineers
 33 1791 Tullie Circle NE
 34 Atlanta, GA 30329
 35 www.ashrae.org
 36
- 37 ASCE American Society of Civil Engineers
 38 1801 Alexander Bell Drive
 39 Reston, VA 20191
 40 www.asce.org
 41
- 42 ASTM American Society for Testing and Materials
 43 1916 Race Street
 44 Philadelphia, PA 19103
 45 www.astm.org
 46
- 47 CS Commercial Standards of the Commodities Division of the
 48 Department of Commerce
 49 Washington, D.C. 20006
 50 www.doc.gov
 51
- 52 EPA Environmental Protection Agency
 53 Ariel Rios Building
 54 1200 Pennsylvania Avenue, N.W.
 55 Washington, DC 20460
 56 www.epa.gov
 57
- 58 Fed. Spec. Federal Specifications of the United States General Services Administration
 59 Specifications and Consumer Information Distribution Section (WF SIS)

REFERENCES

01 42 00-2

1 Washington Navy Yard, Building 197
2 Washington, D. C. 20407
3 www.apps.fss.gsa.gov/pub/fedspecs/iindex.cfm
4
5 FMG FM Global [formerly Factory Mutual (FM)]
6 1301 Atwood Avenue
7 P.O. Box 7500
8 Johnston, RI 02919
9 www.fmglobal.com
10
11 IBC International Building Code
12 Published by International Code Council (see ICC below)
13
14 ICBO International Conference of Building Officials
15 5360 Workman Mill Road
16 Whittier, CA 90601-2298
17
18 ICC International Code Council
19 5203 Leesburg Pike, Suite 708
20 Falls Church, VA 22041-3401
21 www.intlcode.org
22
23 IMC International Mechanical Code
24 Published by International Code Council (see ICC above)
25
26 LEED Leadership in Energy and Environmental Design
27 U.S. Green Building Council
28 1015 18th Street NW, Suite 805
29 Washington, D.C. 20036
30 www.usgbc.org
31
32 NEC National Electric Code published by the
33 National Fire Protection Association
34 (See NFPA below)
35
36 NFPA National Fire Protection Association International
37 Battery March Park
38 Quincy, MA 02269
39 www.nfpa.org
40
41 OSHA Occupational and Safety Health Administration
42 U.S. Department of Labor
43 Occupational Safety & Health Administration
44 200 Constitution Avenue
45 Washington, D.C. 20210
46 www.osha.gov
47
48 OSSC 2019 Oregon Structural Specialty Code (based on the 2018 International Building
49 Code)
50 Building Codes Division
51 1535 Edgewater Street NW
52 Salem, OR 97310
53 www.oregonbcd.org
54
55 PS Product Standards of the Commodities Division of the
56 Department of Commerce
57 Washington, D. C.
58 www.doc.gov
59

REFERENCES

01 42 00-3

- 1 SMACNA Sheet Metal & Air Conditioning Contractors National Association
- 2 4201 Lafayette Center Drive
- 3 Chantilly, Virginia 20151-1219
- 4 www.smacna.org
- 5
- 6 UFAS Uniform Federal Accessibility Standards
- 7 United States Architectural and Transportation Barriers
- 8 Compliance Board
- 9 1111 Eighteenth Street NW, Suite 501
- 10 Washington, D.C. 20036-3894
- 11 www.access-board.gov
- 12
- 13 UL Underwriter's Laboratories
- 14 333 Pfingston Road
- 15 Northbrook, Illinois 60062
- 16 www.ul.com
- 17
- 18 USGBC U.S. Green Building Council
- 19 1015 18th Street NW, Suite 805
- 20 Washington, D.C. 20036
- 21 www.usgbc.org
- 22

TRADE ASSOCIATION REFERENCES

See specific Specification Sections.

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Inspection and testing laboratory qualifications, duties, and responsibilities. Contractor's quality control
5 requirements. Contractor's and Owner's responsibilities.

6
7 **COSTS**

8 **Paid by Owner:**

9 For Testing Laboratory Services specified in this section.

10 For special inspections of concrete, masonry and welding specified in building code.

11 **Paid by Contractor**

12 For inspection and testing required by laws, ordinances, regulations, and orders of Public Authorities, but
13 not specified in this section.

14 For re-inspections and retesting required because of defective work of ill-timed notices.

15
16 **QUALIFICATIONS OF LABORATORY**

17 Independent laboratory acceptable to Architect and Building Official.

18 Meet "Recommended Requirements for Independent Laboratory Qualification," latest edition, published
19 by American Council of Independent Laboratories, 1050 17th Street NW, Suite 1000, Washington,
20 D.C. 20038, (202) 887-5872.

21 Meet ASTM E-329 latest edition, "Standards of Recommended Practice for Inspection and Testing
22 Agencies for Concrete and Steel as used in Construction."

23
24 **LABORATORY'S DUTIES**

25 Provide qualified personnel for specified inspections, sampling, and testing.

26 Ascertain and certify compliance with contract documents.

27 Promptly submit written inspection and test reports to Owner's Representative, Building Official,
28 Contractor, and Architect.

29 Include the following on test reports:

30 Date issued.

31 Project title and locations.

32 Testing laboratory name and address.

33 Inspector's name.

34 Date of inspection or sampling.

35 Record of temperature and weather.

36 Date of test.

37 Identification of product tested.

38 Test location in project.

39 Type of inspection or test.

40 Observations regarding compliance with contract documents.

41 Laboratory is not authorized to:

42 Release, revoke, alter, or enlarge on contract document requirements.

43 Approve or accept any portion of work.

44 Perform any duties for Contractor.

45
46 **CONTRACTOR'S RESPONSIBILITIES**

47 Cooperate with laboratory personnel, provide access to work and to manufacturer's operations.

48 Provide to laboratory, representative samples of materials to be tested, in required quantities.

49 Furnish casual labor and facilities:

50 Provide access to work to be tested.

51 To obtain and handle test samples at site.

52 To facilitate inspections and tests.

53 For laboratory's exclusive use for storage and curing of test samples until removed to laboratory.

54 Notify laboratory at least 24 hours in advance of operations to allow for personnel assignments and test
55 scheduling.

56 Repair test holes to match original conditions.

57
58 **LIABILITY**

59 Laboratory service is provided for Owner's self-assurance and in no way relieves Contractor's

1 responsibility to comply with Contract Documents.
2

3

PART 2 - PRODUCTS

4

5 Not Used

6

7

PART 3 - EXECUTION

8

MASONRY

9

Mortar:

10

11 Prepare in accordance with UBC Standard 24-22, four 2 inch diameter by 4 inch long cylinders for each
12 2000 sq. ft. of wall. Break two at 7 days of age, and unless otherwise directed, break remainder at 28
13 days.

14

Grout:

15

16 Prepare in accordance with UBC Standard 24-22, four cubes approximately 3 X 3 X 6 inches for each 20
17 cu. yds. of grout. Break two at 7 days of age, and unless otherwise directed, break remainder at 28 days.

18

STRUCTURAL STEEL

19

20 See structural plans.

21

22

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES

4 Temporary utilities and miscellaneous temporary facilities required during construction.

5
6 JOB CONDITIONS

7 Establish and initiate use of each temporary facility at time first reasonably required for proper
8 performance of the work. Terminate use and removal of temporary facilities at earliest reasonable time
9 when no longer needed.

10 Comply with governing codes and regulations.

11 Pay required fees and easement assessments.

12 Enforce safe and sanitary practices.

13 Maintain clean facilities.

14 Prevent interference with Owner's normal use of his own facilities.

15 Prevent wasteful utility uses.

16 Should Owner occupy part of facility, Owner will pay his proportional utility cost.

17
18 **PART 2 - PRODUCTS**

19
20 MATERIALS AND EQUIPMENT

21 Materials and equipment may be new or used, but must be suitable and adequate in capacity for required
22 usage.

23
24 **PART 3 - EXECUTION**

25
26 PROJECT SIGN

27 3/4 inch waterproof plywood, 4 x 8 feet size, framed with suitable moldings.

28 Provide immediately after contract is signed, in accordance with Architect's design.

29 Paint two coats prepared paint, color selected.

30 Employ professional sign supplier approved by Architect to letter names of:

31 Project

32 Owner

33 Architect

34 Consulting Engineers

35 General Contractor

36 Secure signboard to nominal 4 x 4 inch wood posts set 4 feet into ground.

37 Place no other signs or advertisements on premises.

38
39 FIELD OFFICE

40 General:

41 Provide substantial weathertight office building on premises where directed.

42 Provide heat, electric light, and janitor service.

43 At Contractor's option, portable buildings suitable for office use may be used.

44 Do not use field office for storage buildings or personnel housing.

45 Required Furnishings:

46 1 plan table large enough to hold open set of contract drawings.

47 1 plan rack large enough to store contract drawings, including record drawings.

48 1 shelf large enough to store project manuals and other similar documents.

49 1 standard lockable, legal size, metal filing cabinet to store shop drawings and other project
50 correspondence.

51 One waste basket.

52
53 TELEPHONE

54 Provide non-coin operated system as follows:

55 One direct-line instrument in field office building.

56 At Contractor's option, coin-operated instruments for employee's use.

57 Subcontractors shall provide and pay for any separate additional instruments that they may require.

58 Allow those connected with work to use, provided they pay for toll calls.

59 Install when work is started, maintain until full completion, pay all charges.

- 1 Provide wall-mounted directory at each instrument listing name and business phone number of at least
- 2 the following:
- 3 Each Contractor and Subcontractor
- 4 Architect
- 5 Architect's Consulting Engineers
- 6 Testing laboratories
- 7 Physicians
- 8 Hospitals
- 9 Ambulance
- 10 Local Fire Department

11
12 **ENVIRONMENTAL PROTECTION**

- 13 General:
- 14 Establish procedures among subcontractors to prevent environmental harm (air pollution, water pollution,
- 15 soil erosion, excessive noise, excessive odors and similar problems).
- 16 Comply with environmental regulations.
- 17 Complete construction operations by methods that minimize pollution and contamination.

- 18 Noise:
- 19 Avoid construction operations that produce harmful noise levels. Restrict use of noisy equipment and
- 20 operations to hours that will have minimum effect on workers and neighboring buildings.

- 21 Dust Control:
- 22 Provide dust-tight enclosures and/or sprinkle with water where necessary to control dust.
- 23 Do not use enough water to cause flooding, icing, or contaminated runoff.
- 24 Protect existing return air duct systems against demolition dust by providing filter media across duct
- 25 openings. Replace dirty media with clean when necessary to protect systems.

- 26 Water Run-off Control:
- 27 Provide erosion control measures as required by Construction Documents. Provide additional measures
- 28 if necessary to control erosion.
- 29 If high water table is encountered during construction, and water removal is necessary from excavations,
- 30 lower water table by means of pumping, trenching below water table or other acceptable means to ensure
- 31 drainage, proper soil compaction and placement of materials.
- 32 Dispose of excess water.
- 33 Where practical, direct excess water to storm water drainage system. Pre-treat water if necessary.
- 34 Conform to anti-pollution laws and regulations.

35
36 **TEMPORARY WATER**

- 37 Mechanical contractor shall provide and maintain water for the following purposes:
- 38 Service standpipe equipped with sufficient 3/4 inch hydrants that any work Center can be reached
- 39 with 100 ft. extension hose. Each Contractor shall provide his own extension hoses.
- 40 Drinking water dispensed in single-service containers or sanitary fountains.
- 41 Maintain cool as practicable, clean and fresh.
- 42 Maintain adequate volume.
- 43 Protect against freezing.
- 44 Water cost shall be paid by the General Contractor.
- 45 Water, in quantities judged reasonable by Architect, will be furnished without charge by Owner.
- 46 Ascertain where water service is available, provide required connections, and extend system to work
- 47 area.

48
49 **TEMPORARY TOILET FACILITIES**

- 50 General Contractor shall provide at the rate of one fixture for each 40 workers.
- 51 Type: Comply with Building Code.
- 52 For enclosures accommodating more than one person, provide privacy screens for each toilet fixture.
- 53 If both men and women are working, provide separate facilities for each sex.
- 54 Maintain sufficient light and ventilation.
- 55 Maintain each toilet with toilet tissue on suitable dispenser.
- 56 Remove temporary toilets and use building fixtures as soon as feasible.
- 57 Disinfect premises after removal and restore to specified condition.

58
59

1 TEMPORARY BARRICADES

2 Provide all necessary to protect public against injury and protect project against damage and
3 unauthorized intrusion.

4
5 TEMPORARY FIRE PROTECTION

6 Provide and maintain necessary facilities and equipment to safeguard project against fire damage.

7
8 TEMPORARY ELECTRICITY

9 Power:

10 Electrical Contractor shall provide and maintain structurally and electrically sound temporary power
11 distribution system as follows:

12 Sufficient 20 amp load centers that any work area can be reached with 100 foot extension cord.

13 Each Contractor shall provide his own grounded, UL approved extension cords.

14 Load centers shall include:

15 Weatherproof distribution boxes.

16 Circuit breakers for each outlet.

17 Equipment grounding continuity for entire system.

18 Power at proper voltage for:

19 Temporary field offices.

20 Temporary storage and construction buildings.

21 Temporary lighting and power.

22 Temporary heating and ventilating.

23 Pumping.

24 Testing and checking equipment.

25 Owner's facilities continuous operation during electrical services change over.

26 General Contractor and Subcontractors shall provide their own power and distribution system for field
27 welders and any other special power beyond that specified herein.

28 Lighting:

29 Provide and maintain temporary lighting as follows:

30 30 ft. candles measured 3 feet above floor in spaces during work. Energize permanent lighting
31 fixtures prior to painting, except where fixtures are mounted on walls or ceilings to be
32 painted. Maintain from 14 minutes prior to until 15 minutes past scheduled work hours. Maintain
33 5 ft candles measured 3 feet above floor as necessary to prevent damage or injury. Maintain
34 when authorized Personnel are present. Provide light control switches at area entrances, or
35 successive areas, so personnel access to project can be through lighted areas.

36 Wiring:

37 Prevent conflict with General Construction.

38 Maintain cords clear of walkways and other heavy traffic areas.

39 Power Source:

40 Electricity, in quantities judged reasonable by Architect, will be furnished without charge by Owner.

41 Ascertain where electrical service is available, provide required connections, and extend system to work
42 area.

43
44 TEMPORARY EXTERIOR ENCLOSURES

45 Provide temporary weather-tight closure of exterior openings to accommodate acceptable working
46 conditions and protection of products, to allow for temporary heating and maintenance of required
47 ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized
48 persons.

49 Provide access doors with self-closing hardware.

50 Provide temporary roofing as required.

51 After work is started, Contractor shall provide a watertight roof enclosure at the end of each day's work.

52
53 TEMPORARY HEATING AND VENTILATING

54 Provide temporary heat and ventilation throughout enclosed construction areas to:

55 Facilitate work progress.

56 Protect work and products against dampness and cold.

57 Prevent moisture condensation on surfaces.

58 Provide suitable ambient temperatures and humidity levels for installation and curing of products.

59 Provide adequate ventilation to meet health regulations for safe working environment.

TEMPORARY FACILITIES AND CONTROLS

01 50 00-4

1 Mechanical Contractor shall expedite work so permanent facilities will be structurally, mechanically, and
2 electrically sound throughout and ready to provide "temporary" service as soon as possible.
3 Operate no permanent heating, ventilating, or air conditioning equipment without Mechanical Engineer's
4 authorization that equipment is properly installed, has clean air filters, and is otherwise properly
5 prepared. Replace temporary air filters with new units and restore system to like-new condition
6 immediately prior to turning project over to Owner.
7 Temporary portable heaters, as may be required, shall be provided by General Contractor.
8 Continue temporary heating and ventilation until Owner occupies or finally accepts project, which ever the
9 sooner.
10 Maintain ventilated areas in clean condition to avoid undue circulation of dust and air-borne particles.
11 Minimum temperatures to be maintained:
12 Generally, 24 hours a day: 40° minimum.
13 Temperatures required for work of various trades: See technical specific specification sections.
14 Fuel costs for temporary heating shall be paid by General Contractor.

15
16 **VEHICLE PARKING AND MATERIAL STORAGE**

17 Coordinate with Owner's Representative.
18 Do not use existing paved streets or paved parking lots.

19
20 **TEMPORARY EQUIPMENT**

21 Thermometer:
22 Maintain one 10 inch minimum size outdoor thermometer. Mount at convenient location not in direct
23 sunlight.
24 Temperature Range: Minus 20°F to plus 110°F.

25
26 **FACILITIES REMOVAL**

27 Remove temporary facilities, at project completion, or sooner, if directed.
28 Repair damage, if any, resulting from temporary facilities.

29
30
31 **END OF SECTION**

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PART 1 - GENERAL

SECTION INCLUDES

General requirements for transportation, handling, storage and protection of materials and equipment. Contractor's options in selection of products, manufacturers and procedures.

PERFORMANCE REQUIREMENTS

Materials and Equipment incorporated into work shall:

Conform to applicable specifications and standards.

Comply with size, make, type, and quantity specified, unless otherwise approved in writing.

Manufactured and Fabricated Products:

Manufactured like parts of duplicate units to standard sizes and gauges, to be interchangeable.

Two or more items of same kind shall be identical, and by same manufacturer.

Products shall be suitable for service conditions.

Equipment shall comply with capacity, sizes, and dimensions shown or specified, unless otherwise approved in writing.

Do not use Materials or Equipment for any purpose other than that for which designed or specified.

CONTRACTOR'S OPTIONS

For products specified only by referenced standard, select any product meeting standard.

For products specified by naming several products, select any one complying with specifications.

For products specified by naming one or more products and "or accepted substitute," select any one specified product or submit request for substitution as required below.

INAPPROPRIATE PRODUCTS AND METHODS

If Contractor believes that any specified product, method, or system is inappropriate for use he shall, if possible, so notify Architect at least 5 working days prior to bid opening, and if not possible such notice shall be given before performing work in question.

If notice of objection is not received within the specified time limits, it will be assumed by the Owner that Contractor agrees that specified products, methods, and systems are not inappropriate for use on this project.

NUMBER OF PRODUCTS REQUIRED

Wherever in Specifications a product is referred to in singular number, such reference shall include as many such products as are shown on Drawings or are required to complete the work.

PRODUCTS LIST

Before Contractor's first request for payment, submit to Architect complete list of major products proposed for use; include proprietary product names, Manufacturer's name, and installing Subcontractor's name.

MANUFACTURER'S INSTRUCTIONS

Perform work in accord with Manufacturer's instructions.

Do not omit preparatory or installation procedures required by Manufacturer, unless specifically modified or exempted by Contract Documents.

When Contract Documents require work to comply with Manufacturer's instructions, obtain and distribute such instructions to parties performing work including two copies to Architect. Maintain one set at job site during installation and until acceptance.

Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in conformance with specified requirements.

Should job conditions or specified requirements conflict with Manufacturer's instructions, consult Architect for further instructions.

Do not proceed with work without clear instructions.

TRANSPORTATION AND HANDLING

Arrange product deliveries in accord with construction progress schedule; coordinate to avoid conflict with work and site conditions.

Deliver products undamaged, in Manufacturer's original containers or packaging, and with legible identifying labels intact.

Immediately upon delivery, inspect shipments to assure that products are properly protected and

PRODUCT REQUIREMENTS

01 60 00-2

- 1 undamaged.
- 2
- 3 **STORAGE AND PROTECTION**
- 4 Follow Manufacturer's instructions.
- 5 Maintain product identity labels legible and intact.
- 6 Store products subject to weather-damage in weathertight enclosures.
- 7 Maintain storage room temperature and humidity within ranges required by Manufacturer's instructions.
- 8 Maintain reasonable protection against product theft and vandalism.
- 9 Exterior Storage:
- 10 Store fabricated products above ground, on blocking or skids; prevent product damage and discoloration.
- 11 Cover products subject to deterioration with impervious sheet coverings; provide adequate ventilation to
- 12 prevent condensation.
- 13 Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter.
- 14 Inspection of Stored Products:
- 15 Arrange storage to permit easy access for inspection.
- 16 Make periodic inspections of stored products to assure that products are maintained as specified and are
- 17 free from damage, discoloration, and deterioration.
- 18 Protection after Installation:
- 19 Provide substantial coverings as necessary to protect installed products against damage and
- 20 discoloration. Remove covering when no longer needed.
- 21
- 22
- 23

END OF SECTION

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PART 1 - GENERAL

SECTION INCLUDES

Provide Field Engineering required for project, including the following:
Layout survey work required for execution of project.
Civil, structural, and other engineering necessary to execute Contractor's construction methods.

WORK BY OWNER

Owner's Representative will, upon request, locate existing control points and property line corner stakes indicated on Drawings.

SUBMITTALS

Submit Engineer's names and addresses to Architect.
When requested, submit documentation to verify engineering accuracy to Architect.
Submit certificate signed by Surveyor certifying whether or not work layout conforms to Contract Documents.

QUALITY ASSURANCE

Engineer's Qualifications:
Land Surveyor: Oregon State Registered Land Surveyor.
Engineers: State-licensed in specific engineering to be performed.
Records:
Maintain complete and accurate log of control for survey work as it progresses.

PART 2 - PRODUCTS

EQUIPMENT

Maintain at project site the following:
Complete transit or laser level
Leveling rod
Plumb bob
6 ft. and 10 ft. straight edges
100 ft. long measuring tape

PART 3 - EXECUTION

SURVEY REFERENCE POINTS

Existing Points: See Drawings.
Locate existing points prior to starting site work, and preserve during construction.
Make no changes to existing points without Architect's approval.
Notify Architect when any point is lost or destroyed, or requires relocation.
Employ Registered Surveyor to replace any lost, destroyed, or relocated points.

PROJECT LAYOUT

Establish at least two permanent bench marks on the site referenced to existing control points.
Record bench mark locations, with horizontal and vertical dimensions, on Project Record Drawings.
Using surveying instruments establish lines and levels for the following:
Site improvements.
Stakes for grading, fill, and topsoil placement.
Utility slopes and invert elevations.
Batter boards for structures.
Building wall and column locations, floor elevations, and similar elements.
Periodically verify layout accuracy.

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Procedures and limitations for cutting, removing, replacing or refinishing products or materials after initial
5 installation of such products or materials.

6
7 **EXTENT OF WORK**

8 Perform all cutting, fitting, and patching, including attendant excavation and backfill, required to complete
9 work or to:

- 10 Make work fit properly together.
- 11 Uncover work for installation of ill-timed work.
- 12 Remove and replace defective work and work not conforming to Contract Documents.
- 13 Remove samples of installed work for testing.
- 14 Provide penetrations through non-structural surfaces for mechanical and electrical work.

15
16 **SUBMITTALS**

17 Submit written request for cutting approval to Architect well in advance of any cutting which affects:

- 18 Work of Owner
- 19 Structural value or integrity of any completed or existing work.
- 20 Waterproof value or integrity of any weather-exposed or moisture-resistant work.
- 21 Visual qualities of any sight-exposed work.

22 Request shall include:

- 23 Project identification.
- 24 Description of affected work.
- 25 Necessity for cutting, alteration, or excavation.
- 26 Effect on Owner's work.
- 27 Effect on structural or weatherproof integrity on completed or existing work.
- 28 Description of proposed work including:
 - 29 Extent of cutting, patching, alteration, or excavation.
 - 30 Trades who will execute work.
 - 31 Products proposed for use.
 - 32 Extent of required refinishing.
- 33 Alternatives to cutting and patching.
- 34 Cost proposal, when applicable.

35 Submit written notice to Architect designating date and time work will be performed.

36
37 **PART 2 - PRODUCTS**

38
39 **MATERIALS**

40 Products similar to those specified elsewhere in this Project Manual:

41 Follow those specifications.

42 Other Products:

43 Follow Architect's instructions.

44
45 **PART 3 - EXECUTION**

46
47 **EXISTING CONDITIONS**

48 Inspect existing conditions and identify work subject to damage or movement caused by proposed cutting
49 and patching.

50 After uncovering work, inspect conditions affecting products installation or performance. Report
51 unsatisfactory and questionable conditions to Architect in writing; do not proceed with work until Architect
52 provides further instructions.

53
54 **PREPARATION**

55 Maintain adequate temporary support necessary to assure structural integrity of affected work.

56 Protect other portions of project work against damage and discoloration.

57 Protect work exposed by cutting against damage and discoloration.

58
59

- 1 PERFORMANCE
- 2 Provide proper surfaces for repairs.
- 3 Employ original installer or qualified contractor to perform cutting and patching for:
 - 4 Weather-exposed or moisture-resistant surfaces.
 - 5 Sight-exposed finished surfaces.
- 6 Restore cut or removed work with new products to provide work complete in accordance with Contract
- 7 Documents.
- 8 Fit work air-tight to pipes, sleeves, ducts, conduits, and other surface penetrations.
- 9 Where patching occurs refinish entire surface to provide even finish to match adjacent work as follows:
 - 10 Continuous Surfaces: Refinish to nearest intersection.
 - 11 Assemblies: Refinish entire unit.

- 12
- 13 **CUTTING STRUCTURAL FRAMING**
- 14 Not permitted at any location, unless shown on Drawings or otherwise approved.
- 15 Exposed Members:
- 16 Not permitted, unless shown on Drawings or otherwise approved.

- 17
- 18 **CLEANING AND REPAIRING**
- 19 Including work of this section, clean, repair and touch-up, or replace when directed, products which have
- 20 been soiled, discolored, or damaged by work of this section. Remove debris from project site upon work
- 21 completion or sooner, if directed.

22
23
24 **END OF SECTION**

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES

4 Special procedures for waste recycling, and material and equipment recycling.

5
6 REGULATORY AGENCY REQUIREMENTS

7 Comply with governing codes, regulations, ordinances, and anti-pollution requirements.
8 Comply with Environmental Protection Agency standards for indoor air quality as they apply to this
9 project.
10 Comply with State Department of Environmental Quality standards.

11
12 COORDINATION

13 Coordinate with other trades affecting or affected by work of this section.
14 Cooperate to maintain continuous operation of Owner's activities.

15
16 **PART 2 - PRODUCTS**

17 Not used.

18
19 **PART 3 - EXECUTION**

20
21 WASTE MANAGEMENT PLAN

22 General:

23 Provide to the Architect, for approval by the Owner, a Waste Management Plan.
24 The Waste Management Plan Form found following this Section may be used in development of the plan.
25 Plan shall include the following:

26 Estimated quantity of total project waste to be generated, name of landfill(s) where project waste
27 will normally be disposed of, tipping fees, and estimated cost of disposing waste in landfill(s).

28 List of all materials proposed to be recycled, including demolition materials and construction
29 waste materials, and estimated total tons to be diverted from landfill(s).

30 Estimate of total tons of the following waste category to be diverted from landfill:

- 31 Concrete
- 32 Asphaltic concrete
- 33 Brick masonry
- 34 Concrete masonry
- 35 Other inorganic material such as rubble, soil and rock

36 Estimate the total cubic yards of the following waste categories to be diverted from landfill:

- 37 Demolition lumber and wood waste
- 38 Dimensional lumber waste
- 39 Plywood, OSB and particle board
- 40 Cardboard, paper and packaging

41 Estimate amounts (weight, sq. ft., sq. yd. gallons, etc.) of the following waste categories:

- 42 Metals
- 43 Carpet and carpet pad
- 44 Acoustic ceiling tile, metal grid and metal supports
- 45 Paint
- 46 Glass
- 47 Gypsum board
- 48 Plastics including foam plastic and film
- 49 Asphalt based roofing
- 50 Equipment and appliances not scheduled for reuse on the project including, HVAC
51 equipment, light fixtures, electrical panels and equipment, fluorescent lamps, and wire
52 and cable.

53 Estimated net additional cost or cost savings resulting from separating and recycling each
54 material. "Net" means that the following have been subtracted from the cost of separating and
55 recycling:

- 56 Revenue from sale of recycled and salvaged materials.
- 57 Landfill tipping fees saved due to diversion of materials from landfill.

58 List of companies or organization which will receive recyclable or salvageable materials.
59 Plan for temporary on-site containment or storage of recyclable materials.

- 1 Plan for instruction of employees and subcontractors on proper sorting and disposal of recyclable
- 2 materials.
- 3 Schedule for regular monitoring of on-site recyclable waste sorting and disposal.
- 4 Plan for tracking and reporting of recyclable material disposal or reuse.

5 Preliminary Draft:

6 Submit one copy of proposed Waste Management Plan. Architect will review, and return with comments.

7 Final Submittal:

8 Submit in final form, one copy of complete Waste Management Plan prior to commencement of

9 construction operations.

10

11 **WASTE RECYCLING**

12 Recycle waste materials resulting from construction operations to the greatest extent possible unless

13 otherwise specified herein.

14 Deliver recyclable waste materials, or arrange for transportation to, a construction materials waste

15 recycling company or enterprise.

16 Provide designated on-site containers for disposal of recyclable and salvageable materials.

17 Instruct employees and subcontractors on proper sorting and disposal of recyclable materials.

18 Periodically remove recyclable materials from site.

19 Dispose of at Contractor's expense at appropriate recycling centers.

20 Maintain recycling area clean and clearly marked in order to avoid contamination and co-mingling of

21 materials.

22 Materials to be recycled include, but are not limited to, the following:

23 Demolition lumber and wood waste

24 Dimensional lumber waste

25 Plywood, OSB and particle board

26 Cardboard, paper and packaging

27 Metals

28 Paint

29 Glass

30 Plastics including foam plastic and film

31

32 **AIR QUALITY**

33 Minimize dust spread, both to the exterior of the building and within the building, to the greatest extent

34 possible.

35 Protect existing return air duct systems against demolition dust by providing filter media across duct

36 openings. Replace dirty media with clean when necessary to protect systems.

37

38 **CLEANING AND REPAIRING**

39 Allow no debris to accumulate in buildings, or on grounds, streets, or walks.

40 Clean, repair and touch-up, or replace when directed, adjacent property and surfaces which have been

41 soiled, discolored, or damaged by work of this Section.

42

43

44

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Cleaning and trash removal during work progress, and at work completion.

5
6 **REGULATORY AGENCY REQUIREMENTS**

7 Comply with governing codes, regulations, ordinances, and anti-pollution requirements.

8
9 **PART 2 – PRODUCTS**

10
11 **CLEANING MATERIALS**

12 Use only those which will not create hazards to health or property and which will not damage surfaces.

13 Use only those recommended by Manufacturer of surface to be cleaned.

14 Use only on surfaces recommended by cleaning material manufacturer.

15
16 **PART 3 – EXECUTION**

17
18 **GENERAL**

19 Follow cleaning material and surface manufacturer's instructions.

20
21 **DURING CONSTRUCTION**

22 Periodically clean to maintain work, site and adjacent properties free from accumulations of waste,
23 rubbish, and windblown debris, resulting from construction operations.

24 Provide on-site containers for collection of waste, debris, and rubbish.

25 Periodically remove waste material, debris, and rubbish and legally dispose of away from project site.

26
27 **DUST CONTROL**

28 Clean interior surfaces prior to painting, and continue cleaning as needed until painting is complete.

29 Schedule cleaning so that resultant dust and contaminants will not fall on wet or newly coated surfaces.

30
31 **FINAL CLEANING**

32 Remove waste, debris, and surplus material from project site.

33 Clean grounds as follows:

34 Paved Surfaces: Remove stains, spills, and foreign substances and sweep clean.

35 Other Surfaces: Rake clean.

36 In addition to debris removal and cleaning specified in other sections, clean exposed-to-view interior and
37 exterior surfaces.

38 Employ skilled workers to perform final cleaning.

39 Remove any temporary protection and labels not required to remain.

40 Remove grease, mastic, adhesive, dust, dirt, stains, fingerprints, labels, and other foreign matter from
41 sight-exposed interior and exterior surfaces.

42 Wash and shine glazing, including mirrors.

43 Polish glossy surfaces to clear shine.

44 Vacuum carpet and similar soft materials.

45 Clean equipment surfaces; remove excess lubricants.

46 Clean and sanitize food service equipment and plumbing fixtures.

47 Ventilating system, if used during construction:

48 Permanent Filters: Clean

49 Disposable Filters: Replace

50 Clean Ducts, Blowers, and Coils: Clean

51 Clean light fixtures and lamps.

52 Remove waste, debris, and foreign matter from roofs and roof drainage system.

53 Maintain structure and components clean until substantial completion.

54
55

56 **END OF SECTION**

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Contract condition requirements and specified administrative procedures in closing out work.

5
6 **SUBSTANTIAL COMPLETION**

7 When Contractor considers work substantially complete, as defined in General Conditions, he shall
8 submit to the Architect:

9 Written notice that work, or designated portion thereof, is substantially complete.

10 List of items to be completed or corrected.

11 Architect will, as soon as possible thereafter, make inspection to determine completion status.

12 Should Architect determine that work is not substantially complete:

13 Architect will promptly notify Contractor in writing, giving reasons therefore.

14 Contractor shall remedy work deficiencies, and send second Notice of Substantial Completion to
15 Architect.

16 Architect will reinspect.

17 When Architect concurs that work is substantially complete, he will:

18 Prepare Certificate of Substantial Completion using AIA Form G704, accompanied with

19 Contractor's list of items to be completed or corrected.

20 Submit Certificate to Owner and Contractor for their written acceptance of the responsibilities
21 assigned to them in the Certificate.

22
23 **FINAL INSPECTION**

24 When Contractor considers work complete, he shall submit written certification that:

25 Contract Documents have been reviewed.

26 Contractor has inspected work for compliance with Contract Documents.

27 Work has been completed in accordance with Contract Documents.

28 Equipment and Systems have been tested in presence of Owner's Representative and are
29 operational.

30 Work is complete and ready for final inspection.

31 Architect will inspect work to verify completion status as soon as possible after receipt of Contractor's
32 certification.

33 Should Architect consider work incomplete or defective:

34 Architect will promptly notify Contractor in writing, listing incomplete or defective work.

35 Contractor shall immediately remedy deficiencies, and send second written certification to

36 Architect that work is complete.

37 Architect will reinspect work.

38 When Architect finds work acceptable under Contract Documents, he shall request Contractor to make
39 closeout submittals.

40
41 **REINSPECTION FEES**

42 Should Architect be required to make more than two final inspections due to Contractor's failure to correct
43 specified deficiencies:

44 Owner will compensate Architect for such additional services.

45 Owner will deduct Architect's compensation amount from Contractor's final payment as follows:

46 Architect's time at \$150.00 per hour.

47 Architect's employees time at currently published hourly rates.

48 Others at 1.10 times the direct cost incurred.

49 Charges will be made for necessary travel time, auto expense computed at the

50 Architect's currently published mileage rate, and all other expenses incurred in making
51 inspections.

52
53 **EVIDENCE OF PAYMENTS AND RELEASE OF LIENS**

54 Contractor shall submit the following:

55 Contractor's Affidavit of Payments of Debts and Claims, AIA Document G706.

56 Contractor's Affidavit of Release of Liens, AIA Document G706A including the following:

57 Consent of Contractor's Surety to Final Payment, AIA Document G707.

58 Contractor's Release of Waiver of Liens.

59 Separate releases or waivers of lien for Subcontractors, Suppliers, and others with lien

- 1 rights against Owner's Property, together with list of those parties.
- 2 Duly sign and execute all submittals before delivery to Architect.
- 3
- 4 **CONTRACTOR'S CLOSEOUT SUBMITTALS TO ARCHITECT**
- 5 Extra Materials:
- 6 Verify and comply with each specification section for required extra stock of materials or product.
- 7 Certificate of domestic water disinfection.
- 8 Project Record Documents, see Section 01 78 39.
- 9 Owner's Operating and Maintenance Manual, see Section 01 78 83.
- 10
- 11 **INSTRUCTION**
- 12 Instruct Owner or Owner's personnel in operations of all systems and equipment in accordance with
- 13 Section 01 78 83.
- 14
- 15 **FINAL ADJUSTMENT OF ACCOUNTS**
- 16 Submit final statement of accounting to Architect, including the following:
- 17 Original contract sum.
- 18 Additions and deductions resulting from:
- 19 Previous change orders.
- 20 Other adjustments.
- 21 Deductions for uncompleted work.
- 22 Deductions for reinspection payments.
- 23 Total Contract Sum, as adjusted.
- 24 Previous payments.
- 25 Sum remaining due.
- 26 Architect will prepare and issue final Change Order, reflecting approved adjustments to Contract Sum not
- 27 previously made by change orders.
- 28
- 29
- 30

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES

4 Compile product data and related information appropriate for Owner's maintenance and operation of
5 Products furnished under Contract.

6 Prepare as specified herein and in other specification sections.

7 Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

8
9 QUALITY ASSURANCE

10 Data preparation shall be done by personnel:

11 Trained and experienced in maintenance and operation of described products.

12 Completely familiar with requirements of this section.

13 Sufficiently skilled as technical writer to communicate essential data.

14 Sufficiently skilled as draftsman to competently prepare required drawings.

15
16 FORM OF SUBMITTALS

17 Printed Copies:

18 Prepare data in form of instructional manual for use by Owner's personnel.

19 Format:

20 Size: 8 1/2 X 11 inches.

21 Text: Manufacturer's printed data or neatly typed.

22 Drawings:

23 Reinforce edges against tear-out.

24 Bind-in with text.

25 Fold larger drawings to match size of text pages.

26 Provide fly-leaf for each separate product.

27 Identify each fly-leaf with labeled tabs.

28 Cover: Identify each volume with typed or printed title "Operating and Maintenance Instructions,"
29 and list:

30 Project title

31 Identity of general subject matter contained in manual.

32 Electronic Copy:

33 Prepare data in the form of PDF files. Electronic files may be separate for Divisions 1 through 14,
34 Divisions 21 through 23 and Divisions 26 through 28.

35 Provide one copy to the Owner on Compact Disk (CD) or Digital Video Disk (DVD).

36
37 **PART 2 - PRODUCTS**

38
39 BINDERS

40 Commercial quality, three-ring type with durable and cleanable plastic covers.

41 When multiple binders are used, correlate data into related consistent groupings.

42
43 MANUAL CONTENT, GENERAL

44 Neatly typewritten table of contents for each volume, arranged in systematic order.

45 List:

46 Contractor, name of responsible principal, address, and telephone number.

47 Each product including name, address, and telephone number of:

48 Subcontractor or installer

49 Recommended maintenance contractor

50 Local source for replacement parts

51 Product name and other identifying symbols as set forth in Contract Documents.

52 Product Data:

53 Include only those sheets which are pertinent to specific product.

54 Annotate each sheet to:

55 Clearly identify product or part installed.

56 Clearly identify data applicable to installation.

57 Delete references to inapplicable data.

58 Drawings:

59 Supplement product data with drawings where necessary to clearly illustrate:

- 1 Relations of component parts
- 2 Control and flow diagrams
- 3 Do not use Project Record Documents as maintenance drawings.
- 4 Written Text:
- 5 Provide where necessary to supplement Product Data and Drawings.
- 6 Organize in consistent format under separate headings for different procedures.
- 7 Provide logical sequence of instructions for each procedure.
- 8 Warranties, Bonds, and Maintenance Contracts:
- 9 Provide copy of each.
- 10 Including the following:
- 11 Proper procedures in event of failure.
- 12 Instances which might affect validity of Warranties, Bonds, or Contract.

MANUAL FOR ARCHITECTURAL MATERIALS AND FINISHES

- 15 Include the following Manufacturer's data:
- 16 Catalog number, size, composition.
- 17 Color and texture designations.
- 18 Required reordering information.
- 19 Recommended cleaning materials and methods.
- 20 Cautions against detrimental cleaning materials and methods.
- 21 Recommended cleaning and maintenance schedule.
- 22 Submit specified information as called for in each specification section.

MANUAL FOR WEATHER PROTECTION MATERIALS

- 25 Include the following Manufacturer's data:
- 26 Applicable manufacturing standards.
- 27 Instructions for inspection, maintenance, and repair.
- 28 Submit specified information as called for in each specification section.

MANUAL FOR MECHANICAL EQUIPMENT AND SYSTEMS

- 31 Include the following Manufacturer's data:
- 32 Description of unit and component parts including:
- 33 Function, normal operating characteristics, and limiting conditions.
- 34 Performance curves, engineering data and tests.
- 35 Complete nomenclature and commercial number of replaceable parts. Operating
- 36 procedures including:
- 37 Start-up, break-in, routine and normal operating instructions.
- 38 Regulation, control, stopping, shut-down, and emergency instructions.
- 39 Summer and winter operating instructions.
- 40 Special operating instructions.
- 41 Maintenance procedures including:
- 42 Routine operations.
- 43 Trouble-shooting guide.
- 44 Disassembly, repair, and reassembly.
- 45 Alignment, adjusting, and checking.
- 46 Servicing and lubricating schedule, including recommended Lubricants.
- 47 Manufacturer's printed operating and maintenance instructions.
- 48 Control Systems operation sequences.
- 49 Parts list, illustrations, assembly drawings, and diagrams necessary for maintenance, including:
- 50 Life expectancy of parts subject to wear.
- 51 Items recommended to be stocked as spare parts.
- 52 As-installed control system diagrams.
- 53 Color-code legend, if any.
- 54 Valve Tag Number Chart, with location and function of each valve.
- 55 Submit specified information for the following:
- 56 Mechanical Equipment specified in Division 23.

MANUAL FOR ELECTRICAL EQUIPMENT AND SYSTEMS

- 59 Include the following Manufacturer's data:

- 1 Description of unit and component parts including:
- 2 Function, normal operating characteristics, and limiting conditions.
- 3 Performance curve, engineering data and tests.
- 4 Complete nomenclature and commercial number of replaceable parts.
- 5 Panelboard circuit directories indicating:
- 6 Electrical service.
- 7 Controls.
- 8 Communications, if any.
- 9 As-installed wiring color-code legend, if any.
- 10 Operating procedures, including:
- 11 Routine and normal operating instructions.
- 12 Sequences required.
- 13 Special operating instructions.
- 14 Maintenance procedures, including:
- 15 Routine operations.
- 16 Trouble-shooting guide.
- 17 Disassembly, repair, and reassembly.
- 18 Adjustment and checking.
- 19 Manufacturer's printed operating and maintenance instructions.
- 20 Parts list, including current prices, and recommended spare parts to be maintained in storage.
- 21 Submit specified information for the following:
- 22 Electrical equipment specified in Divisions 23 and 26.

23
24 **ADDITIONAL DATA**

- 25 Prepare and include the following:
- 26 Additional data when need become apparent during instruction of Owner's personnel.
- 27 Additional data specified in other sections of Specifications to be included.

28
29 **PART 3 - EXECUTION**

30
31 **SUBMITTAL SCHEDULE**

- 32 Preliminary Draft:
- 33 Submit two copies of proposed format. Architect will review, and return one copy with comments.
- 34 Final Submittal:
- 35 Submit, in final form, one copy of complete data 15 days prior to final inspection.
- 36 Copy will be returned with comments.
- 37 Submit one copy, in approved final form, within 10 days of final inspection.

38
39 **INSTRUCTION OF OWNER'S PERSONNEL**

- 40 Prior to final acceptance, instruct Owner's personnel in operation, adjustment, and maintenance of all
- 41 products, equipment, and systems.
- 42 Operating and Maintenance Manual shall constitute basis of instruction.
- 43 Submit training materials and instruction schedule for Architect's review and acceptance at least 30 days
- 44 prior to training session.
- 45 Training:
- 46 Location: At project site.
- 47 Review manual contents with Owner's personnel in detail to explain all aspects of operations and
- 48 maintenance.

49
50
51 **END OF SECTION**

- 1 REQUIREMENTS INCLUDED
- 2 Compile specified warranties and bonds.
- 3 Compile specified service and maintenance contracts.
- 4 Review submittals to verify compliance with Contract Documents.
- 5
- 6 SUBMITTAL REQUIREMENTS
- 7 Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective
- 8 Manufacturers, Suppliers, and Subcontractors.
- 9 Number of original signed copies required: Provide 1 for each volume of Owner's maintenance manual
- 10 as specified in Section 01 78 23.
- 11 Table of Contents: Neatly typed in orderly sequence.
- 12 Provide complete information for each item:
- 13 Product or work item.
- 14 Firm, with name of principal, address and telephone number.
- 15 Beginning date of warranty, bond, or service and maintenance contract.
- 16 Duration of warranty, bond, or service and maintenance contract.
- 17 Provide the following information for Owner's personnel:
- 18 Procedure in case of failure or malfunction.
- 19 Instances which affect warranty or bond validity.
- 20 Contractor, name of responsible principal, address, and telephone number.
- 21
- 22 SUBMITTAL FORM
- 23 Punch sheets for standard 3-ring binder.
- 24 Size: 8 1/2 x 11 inches.
- 25 Fold larger sheets to fit into Binder.
- 26 Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS".
- 27 List:
- 28 Title of project.
- 29 Name of Contractor.
- 30 Electronic Copy:
- 31 Prepare data in the form of PDF files.
- 32 Provide one copy to owner on Compact Disk (CD) or Digital Video Disk (DVD).
- 33
- 34 SUBMITTAL TIME
- 35 See Section 01 78 23.
- 36
- 37 SUBMITTAL LOCATION
- 38 Bind into Owner's maintenance manuals specified in Section 01 78 23.
- 39
- 40
- 41

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Procedures for Record Documents to be used throughout the execution of the work and at final
5 completion of the work.

6
7 SUBMITTAL
8 At Contract close-out deliver Record Documents to Architect for Owner.
9 Accompany submittal with transmittal letter in duplicate, containing:
10 Project title.
11 Date.
12 Contractor's name and address.
13 Title and number of each Record Document.
14 Signature of Contractor or his authorized representative.

15
16 DRAFTER'S QUALIFICATIONS
17 Drafter must be competent, skilled, and approved by Architect.

18
19 **PART 2 - PRODUCTS**

20
21 REQUIRED DOCUMENTS
22 Maintain at project site for Owner one record copy of:
23 Contract Drawings and Specifications.
24 Addenda.
25 Change Orders and other Contract Modifications.
26 Field Orders and other written instructions.
27 Approved Shop Drawings, Product Data, and Samples.
28 Field Test Reports.

29
30 REQUIRED DRAWINGS
31 Maintain one black-line or blue-line print of Contract Drawings as "work set", marking as required to
32 record all Contract changes.
33 Prior to submittal, transfer recorded information to reproducible tracing.
34 Contractor may retain "work-set" for his records.

35
36 **PART 3 - EXECUTION**

37
38 MAINTENANCE OF DOCUMENTS AND SAMPLES
39 Store in Contractor's field office apart from documents used for construction.
40 Provide files, shelving, and cabinets necessary to safely and securely store documents and samples.
41 Maintain documents clean, dry, legible, and in good order.
42 Do not use Record Documents for construction purposes.
43 Make documents available at all times for Architect's inspection.

44
45 RECORDING
46 Label each document "Project Record" in neat, large, printed letters.
47 Record information concurrently with construction progress.
48 Do not conceal any work until required information is recorded.
49 Drawings; legibly mark to record the following actual construction:
50 Depths of foundation elements in relation to first floor elevation.
51 Horizontal and vertical locations of underground utilities and Appurtenances, referenced to
52 permanent surface improvements.
53 Location of internal utilities and appurtenances concealed in construction, referenced to visible
54 and accessible features of structure.
55 Field changes of dimensions and details.
56 Changes made by Change Order or Construction Change Directive.
57 Details not shown on original Contract Drawings.
58 Specifications and Addenda: Legibly mark to record the following:
59 Manufacturer, trade name, catalog number, and supplier of each product actually installed.

1 Changes made by Change Order or Construction Change Directive.

2

3

4

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Demolition and removal of existing construction indicated or specified. Disconnection, capping or
5 removal of utilities. Special procedures for material and equipment to be reused.

6
7 EXTENT OF WORK
8 Do all demolition required for completion of work shown in Documents.

9
10 SALVAGE
11 To Owner:
12 None
13 To Contractor:
14 All other salvage becomes property of Contractor.
15 It may be re-used on work if Architect judges it equal to new products specified.
16 Remove all other material from site.

17
18 COORDINATION
19 Coordinate with other trades affecting or affected by work of this section.
20 Cooperate to maintain continuous operation of Owner's activities.

21
22 **PART 2 - PRODUCTS**

23
24 PLYWOOD
25 Sound; thickness as required to satisfy installation and use conditions.

26
27 GYPSUM BOARD
28 5/8 inch, Type X, gypsum wallboard.

29
30 PLASTIC SHEETING
31 Polyethylene sheet, minimum 6 mil thickness, clear or translucent ***black*** color.

32
33 FILTER MEDIA
34 Fiberglass, 8 inch minimum thickness, or accepted substitute.

35
36 WHEELING EQUIPMENT
37 Use only pneumatic-tired equipment.

38
39 **PART 3 - EXECUTION**

40
41 EXAMINATION
42 Verify that structure to be demolished is vacant and not in use.
43 Do not start work until conditions are satisfactory.

44
45 PREPARATION
46 Prevent movement or settlement of adjacent structure(s).
47 Provide bracing and shoring.
48 Arrange for, and verify utility service termination including capping active lines.
49 Remove salvage and store where directed.

50
51 DEMOLITION EXECUTION
52 Demolish indicated structures and appurtenances in an orderly and careful manner.
53 Cease operations and notify Architect immediately of adjacent structure(s) appear to be endangered. Do
54 not resume operations until corrective measures have been taken.
55 Remove materials to be reinstalled or retained in manner to prevent damage.
56 Saw-cut slabs and pavement with vertical, straight-line joints using power saw designed for cutting
57 asphalt or concrete.

58
59 DUST-PROOF PARTITIONS

- 1 Build where necessary to prevent dust-spread.
- 2 Face with plywood nailed solidly to studs and cross blocking.
- 3 Cover joints with reinforced kraft paper cemented in place.
- 4 Maintain dust-proof; remove only when no longer needed.
- 5 Provide access and egress doors as required to maintain fire escape routes.

- 6
- 7 **DUST CURTAINS**
- 8 Construct of plastic sheeting.
- 9 Provide where necessary or where directed to prevent dust-spread.
- 10 Install continuously from floor to ceiling.
- 11 Fasten to existing construction in such a manner to prevent sagging and accidental damage or removal.
- 12 Do not damage existing construction to remain.
- 13 Cover joints with tape.
- 14 Provide temporary supports for sheeting as required.
- 15 Maintain dust-proof; remove only when no longer needed.
- 16 Provide access and egress curtains as required to maintain fire escape routes.

- 17
- 18 **SOUND-INSULATING PARTITIONS**
- 19 Build where necessary to prevent disturbing building occupants.
- 20 Weave insulating blanket through staggered studs.
- 21 Face both sides with plywood nailed solidly to studs and cross blocking.
- 22 Cover joints with reinforced kraft paper cemented in place.
- 23 Maintain dust-proof and approximately sound-proof; remove only when no longer needed.
- 24 Provide access and egress doors as required to maintain fire escape routes.

- 25
- 26 **CLEANING AND REPAIRING**
- 27 Allow no debris to accumulate in buildings, or on grounds, streets, or walks.
- 28 Haul away from site as soon as removed.
- 29 Dispose of at Contractor's expense.
- 30 Clean, repair and touch-up, or replace when directed, adjacent property and surfaces which have been soiled, discolored, or damaged by work of this Section.

- 31
- 32
- 33 **PROTECTION**
- 34 General:
- 35 Protect portions of existing facilities which are to remain against damage and discoloration.
- 36 Allow no leaks, even temporary, in existing building.
- 37 Barriers, Safety Guards, and Warning Lights:
- 38 Provide where necessary for public protection.
- 39 Utilities:
- 40 Keep active utilities intact and in continuous operation.
- 41 Keep street drains and sewers open, for free drainage at all times.
- 42 Party Walls:
- 43 Exercise extreme care not to damage party walls and adjacent construction.
- 44 Neighboring Property and Adjacent Spaces:
- 45 Such protection includes neighboring property, occupants of said property, customers, visitors, and passers-by against damage, injury, and discomfort.
- 46 Provide dust-tight chutes and/or sprinkle with water where necessary to control dust.
- 47 Do not use enough water to cause flooding, icing, or contaminated runoff.
- 48 Protect existing return air duct systems against demolition dust by providing filter media across duct openings. Replace dirty media with clean when necessary to protect systems.
- 49 Keep streets and walks clean and free from obstructions.
- 50 Existing Trees:
- 51 Protect against damage. See Section 01 56 39.

52
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56

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Permanent and temporary formwork and accessories for placing of structural and architectural cast-in-
5 place concrete.

6
7 WORK INSTALLED BUT FURNISHED BY OTHERS
8 Build in as directed by those Contractors, without weakening or defacing formwork.

9
10 DESIGN AND ENGINEERING
11 Formwork design and engineering, as well as construction are Contractor's responsibility.

12
13 DELIVERY, STORAGE, AND HANDLING
14 Protect against damage and discoloration.

15
16 COORDINATION
17 Coordinate with other trades affecting or affected by work of this section.

18
19 **PART 2 - PRODUCTS**

20
21 PLYWOOD FORMS
22 APA B-B Plyform grade plywood, Class 1.
23 Thickness: As required by concrete placement rate.
24 Provide at all vertical concrete work.

25
26 PLANK FORMS
27 Douglas fir or hemlock, S4S, green, with no loose knots or knot holes; maximum knot size 1-1/2 inch and
28 well scattered.
29 Size as required to support concrete at rate poured.
30 Provide at footing and flatwork perimeters, unless otherwise indicated.

31
32 FORM TIES
33 For all Work:
34 Plastic cone type, Burke, Bowman, Richmond, Dayton, or approved, with standard breakback, and type
35 recommended by manufacturer for conditions of installation.
36 Wire ties and wood spacers not permitted.

37
38 EMBEDDED ITEMS
39 Steel Reinforcement:
40 Refer to Section 03 20 00.
41 Masonry Anchor Slots:
42 Approved type galvanized steel slot with wood, foam, or fiber insert; Heckman No. 100, or accepted
43 substitute. Submit sample.
44 Provide for masonry abutting concrete.

45 Reglets:
46 Furnished by other subcontractors.

47 Anchor Bolts:
48 Furnished by steel fabricator.

49
50 FORM TREATMENT
51 For Plank Forms:
52 Clean water.
53 For Plywood Forms:
54 Coat with approved stainless form oil, using minimum quantity required for satisfactory form removal.

55
56 **PART 3 - EXECUTION**

57
58 PREPARATION
59 Conform to shapes, lines, and dimensions shown on Drawings.

- 1 Brace and tie together to insure that position and shape are maintained.
- 2 Make tight to prevent mortar leakage.
- 3 Arrange joints as indicated or directed.
- 4 Form for surface indentations, as shown on Drawings.
- 5 Provide access openings as required for cleaning and inspection of forms and embedded items prior to
- 6 placing concrete. Locate where not exposed to view.
- 7 Anchor as required to prevent upward or lateral formwork movement during concrete placement.

8 9 PLYWOOD FORMS

- 10 Prevent plywood end grain from forming concrete exposed to view.
- 11 Construct beam side forms for removal without disturbing bottom forms or shoring.

12 13 BRACING

- 14 Provide as required to meet load requirements.
- 15 Protect against undermining or settlement when placed on ground.
- 16 Anchor as required to prevent upward or lateral formwork movement during concrete placement.

17 18 FORM TIES

- 19 Unless otherwise indicated or approved, locate equidistant and symmetrical; align vertically and
- 20 horizontally.

21 22 OPENINGS AND CHASINGS

- 23 Provide openings and chasings of slabs and walls for mechanical and electrical work.
- 24 Sizes and locations as directed by mechanical and electrical trades.

25 26 CHAMFERS

- 27 Except at flush joints between adjacent materials, chamfer exposed external corners of concrete with 3/4
- 28 inch triangular wood strips placed in forms.

29 30 TREATMENT OF FORMS

31 Plank Forms:

- 32 Keep wet previous to placing concrete; wet thoroughly just before concrete placing.

33 Plywood Forms:

- 34 Apply coating to contact surfaces in accordance with manufacturer's directions.
- 35 When treating previously set forms, prevent coatings from covering reinforcing steel or existing concrete
- 36 where bond is required.
- 37 Prohibit coatings from collecting in puddles.

38 39 EMBEDDED ITEM INSTALLATION

40 Steel Reinforcement:

- 41 Refer to Section 03 20 00.

42 Masonry Anchor Slots:

- 43 Secure in true vertical or horizontal position as shown on Drawings, in accordance with manufacturer's
- 44 directions.

45 Reglets:

- 46 Accurately secure in true position in accordance with manufacturer's directions to provide leak-proof
- 47 joints.

48 Anchor Bolts:

- 49 Secure in accordance with approved setting drawings. Set with templates to assure accurate bolt
- 50 positioning.

51 52 TOLERANCES

53 Variation from level:

54 Slab Soffits, Beam Soffits, and Arrises:

- 55 1/8 inch in 10 ft.
- 56 3/16 inch in any bay or 20 ft. maximum.
- 57 3/8 inch in 40 ft. or more.

58 Sills and Conspicuous Lines:

- 59 3/16 inch in any bay or 20 ft. maximum.

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PART 1 - GENERAL

SECTION INCLUDES

Reinforcing steel and required supports for cast-in-place concrete and reinforced masonry.

REFERENCES

"2019 Oregon Structural Specialty Code (OSSC) based on the International Building Code (IBC) 2018 Edition", published by the International Code Council (ICC).
 "Manual of Standard Practice for Detailing Reinforced Concrete Structures Standard 315" (ACI Manual 315), published by American Concrete Institute, Box 19150, Redford Station, Detroit, Mich. 48219.
 "Manual of Standard Practice" (CRSI Manual), published by Concrete Reinforcing Steel Institute, 180 N. LaSalle Street; Chicago, Ill. 60601.

SUBMITTALS

Submit in accordance with Section 01 33 00.

Shop Drawings:

Follow ACI Manual 315.

PRODUCT DELIVERY, HANDLING AND STORAGE

Protect against damage, rust, mud, grease, and oil.
 Tag each piece or bundle; indicate size, grade, and location.

COORDINATION

Coordinate with other trades affecting or affected by work of this section.

PART 2 - PRODUCTS

BARS

ASTM A 615, #3 and smaller: Grade 40; #4 and larger: Grade 60.

SMOOTH WIRE REINFORCING

ASTM A 615, Grade 60.

TIE WIRE

Black, annealed steel 16 ga. minimum; Fed. Spec.QQ-W-461.

ACCESSORIES

General:

Conform to CRSI "Manual of Standard Practice."
 Include all devices necessary for proper reinforcement placement, spacing, supporting, and fastening.
 Fabricate from concrete ceramics, metal or plastic. Galvanize metal accessories in contact with finished concrete surfaces.

Slab-on-grade Bar Supports:

Precast concrete spacer blocks at bars placed over vapor retarders; wire chairs permitted only where vapor retarders are not scheduled.

FABRICATION

Follow CRSI "Manual of Standard Practice."

TOLERANCES

Fabrication:

Sheared length: Plus or minus 1 inch.
 Stirrup, Spiral, and Tie dimensions: 1/2 inch plus or minus.
 All other bend dimensions: Plus or minus 1 inch.

PART 3 - EXECUTION

EXISTING CONDITIONS

Verify that surfaces to receive reinforcement are accurately sized and located, square, plumb, rigid,

- 1 secure, and otherwise accurately prepared.
2 Prior to starting work notify general contractor of defects requiring correction.
3
4 **INSTALLATION**
5 General:
6 Conform to Building Code and the following:
7 Bending:
8 Bend bars without heat.
9 Field bending partially embedded bars not permitted without Architect's approval.
10 Placing:
11 Secure against displacement.
12 Do not displace or damage vapor barrier.
13 Spacing:
14 Clear distance between parallel bars, including splices, unless otherwise permitted by Code, not less
15 than:
16 Nominal Bar diameter.
17 1-1/2 times maximum concrete aggregate size.
18 1 inch.
19 Splicing:
20 Do not weld or tackweld reinforcement splices.
21 Minimum Lap at Splices at Bar Reinforcement: 24 bar diameters.
22 Protective Concrete Covering:
23 At principal structural members cast directly against the ground, including footings: 3 inches minimum.
24 At principal structural members in direct contact with the ground after formwork removal: 2 inches
25 minimum.
26 At walls not exposed directly to ground or weather: 3/4 inches minimum, or bar diameter, whichever the
27 larger.
28 All other locations: 1-1/2 inches minimum, or bar diameter, whichever larger.
29
30 **SPECIAL REINFORCEMENT**, unless otherwise shown on Drawings
31 Masonry Reinforcement Bars:
32 At reinforced masonry walls cast bar dowels into concrete as required to develop continuity between
33 masonry and concrete; space and size dowels as shown on Drawings.
34 Support vertical bars at top and at 192 bar diameter maximum intervals.
35 Splice bars at 30 bar diameter intervals.
36 At Wall Corners and Intersections:
37 Splice horizontal wall reinforcing with corner bars; same size and spacing. Extend beyond corner or
38 intersection 40 bar diameters, minimum.
39 At Wall Openings:
40 Provide 1 each #5 bars around openings; extend 24 inches minimum beyond corners.
41 At Slab Re-entrant Corners:
42 Provide 1 each, 48 inch long, #4 bar diagonally across corner.
43
44 **TOLERANCES**
45 Placement:
46 Concrete cover: Plus or minus 1/4 inch.
47 Spacing between Bars: 1/4 inch.
48 Top Bars in Slabs and Beams:
49 Members 8 inches deep or less: Plus or minus 1/4 inch.
50 Members from 8 to 24 inches deep: Plus or minus 1/2 inch.
51 Members more than 24 inches deep: Plus or minus 1 inch.
52 Stirrups and Transverse Bars: Space evenly within 2 inches of stated separation.
53 Bar relocation to avoid interference with other reinforcement, conduits, or embedded Items: 1 Bar
54 diameter, unless otherwise approved by Architect.
55
56 **COORDINATION**
57 Coordinate with other trades affecting or affected by work of this section.
58
59

CONCRETE REINFORCING

03 20 00-3

- 1 CLEANING AND REPAIRING
- 2 Prior to concrete placement, remove loose flaky rust, mud, oil, and other bond-reducing coatings; conform
- 3 to IBC, Chapter 19.
- 4 Remove debris from project site upon work completion or sooner, if directed, including work of other
- 5 sections, clean, repair and touch-up, or replace when directed, products which have been soiled,
- 6 discolored, or damaged by work of this section.
- 7
- 8
- 9

END OF SECTION

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PART 1 - GENERAL

SECTION INCLUDES

Cast-in-place or in-situ concrete for structural building frame, slabs on fill or grade, and other concrete components associated with the construction.

RELATED SECTIONS

- 03 11 00 Concrete Forming
- 03 20 00 Concrete Reinforcement

DEFINITIONS

Architectural Concrete: Cast-in-Place Concrete that is EXPOSED to view on surfaces of completed structure or building, and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

SUBMITTALS

Submit in accordance with 01 33 00.

Shop Drawings:

For any location where layout and detailing has been provided in the Contract Documents, submit Shop Drawings indicating understanding for architect's approval.

Product Data:

Design Mixes: Submit for each type and class of concrete specified.

Include prior laboratory test data and compressive strength results in accordance with ACI 301 and ASTM standards.

Indicate amounts of mixing water to be withheld for later addition at Project site.

Samples:

Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.

Verification Samples: Submit sample chips of specified colors indicating pigment numbers and required dosage rates, for subsequent comparison to installed concrete.

QUALITY ASSURANCE

Perform work in accordance with ACI 301.

Obtain materials from same source throughout the work.

Installer Qualifications:

A qualified installer with a minimum of 3 years of experience, who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician."

Manufacturer Qualifications:

A firm with a minimum of 3 years of experience in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94 M requirements for production facilities and equipment."

Pre-Installation Meeting:

Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, coordinate with mechanical requirements for hydronic floor heating, embedded items and penetrations required by other trades.

Establish condition and finish of concrete surfaces, including exposed form finish concrete.

Review construction joint layouts at walls and slabs.

Review control joint layouts at slabs.

APPEARANCE AND PERFORMANCE CRITERIA OF EXPOSED ARCHITECTURAL CONCRETE

Where a surface does not comply with all of the criteria listed below, the Architect shall make a judgment about whether the surface needs to be repaired or patched.

All Architectural Concrete surfaces on mockup and completed building to be free of the following:

Surface voids or rock pockets in excess of 1/2 inch diameter.

Quantity of surface voids or rock pockets (1/2 inch or less in diameter) in excess of one per eight square feet.

Voids or sand pockets due to fluid loss through formwork.

Honey combs.

Discoloration.

- 1 Misalignment, incorrect profiles, damage or cracking due to imposed loads.
- 2 "Lift lines" and cold joints.
- 3
- 4 **PRODUCT DELIVERY, HANDLING, AND STORAGE**
- 5 Protect against deterioration, foreign matter intrusion, contamination, and dampness.
- 6 Conform to ASTM C 94.
- 7
- 8 **ENVIRONMENTAL REQUIREMENTS**
- 9 Cold Weather:
- 10 Place no concrete on frozen subgrade.
- 11 Remove ice and snow from reinforcing, forms, and embedded items.
- 12 Raise temperature of all surfaces in contact with concrete above freezing prior to concrete placement.
- 13 Minimum concrete temperature during placement: 65°F.
- 14 Minimum concrete temperature for 72 hours after placement: 55°F.
- 15 Maximum air temperature drop during first 24 hours after protection removal: 55°F.
- 16 Use of salts or chemical admixtures to prevent concrete freezing prohibited.
- 17 Do not permit temporary heaters to locally over-heat or over-dry concrete.
- 18 Assume responsibility, including costs, for testing suspected frozen concrete.
- 19 Remove and replace freeze-damaged concrete at contractor's expense.
- 20 Warm Weather:
- 21 When air temperature exceeds 90°F and when wind exceeds 20 mph place concrete in accordance with
- 22 the following requirement:
- 23 Maximum concrete temperature at time of placement 75°F.
- 24 Mix concrete minimum possible time, and place as soon as possible thereafter.
- 25 Sprinkle forms, reinforcing, embedded items, and subgrade with cool water immediately prior to concrete
- 26 placement.
- 27 Protect unstripped formwork and exposed concrete surfaces against excessive drying with water spray, or
- 28 other approved method.
- 29 Assume responsibility, including costs, for testing suspected damaged concrete.
- 30 Remove and replace damaged concrete at contractor's expense.
- 31
- 32 **COORDINATION**
- 33 Coordinate with other trades affecting or affected by work of this section.
- 34
- 35 **PART 2 - PRODUCTS**
- 36
- 37 **PORTLAND CEMENT**
- 38 ASTM C 150, Type 1.
- 39 Use one brand only for exposed concrete.
- 40
- 41 **AGGREGATE**
- 42 Conform to ASTM C 33.
- 43 Maximum size: 3/4 inch, and not more than one-fifth of narrowest space between forms, one-third of slab
- 44 depths, nor three-fourths of minimum clear space between reinforcing bars.
- 45 Maximum size for exposed aggregate: 3/4 inch.
- 46 Use same source for coarse and fine aggregate used in exposed concrete.
- 47 Minimum 60% of surface of coarse aggregate to have crushed faces.
- 48
- 49 **ENTRAINED AIR**
- 50 ASTM C 260, non-toxic after 30 days, not containing chloride.
- 51 Provide in exterior curbs, walks, and flatwork that are subject to freezing while wet.
- 52
- 53 **WATER REDUCING ADMIXTURES (PLASTICIZER)**
- 54 ASTM C 494, Type A.
- 55 Provide at all concrete slabs on grade.
- 56 May be used at Contractor's option.
- 57 Provide with dosages high enough to reduce water by minimum 10% from the same mix without
- 58 admixture.
- 59

1 CALCIUM CHLORIDE
 2 Not approved for use.
 3
 4 BONDING AGENT
 5 Euclid "Flex-Con", W.R. Meadows "Interlock 1059", Sika "Sika Bond", Tammsweld, Larsen "Weld-Crete",
 6 Nox-Crete "Vinl-hesive", Dayton Superior J-40, or accepted substitute.

7
 8 EXPANSION JOINT FILLER
 9 W.R.Meadows Fibre Expansion Joint #320-F, 1/2 inch thick, conforming to ASTM D 1751.
 10 Depth as required to bring top to within 1/4 inch of surface of slab.
 11 Flexible foam type, 1/2" thick, depth as required to bring top to within 1/4 inch of surface of slab.
 12 May be provided with removable top portion for ease of sealant installation.

13
 14 NON-SHRINK GROUT
 15 Heavy-duty, high early strength, non-shrink, non-metallic, non-staining type, conforming to ASTM C 1107
 16 and CRD-C621; Sonneborn "Sonogrout 14K", Dayton Superior "1107 Advantage Grout", "Tammsgrout
 17 Supreme", Sika "Sikagrout 121", or accepted substitute.
 18 Provide as Follows:
 19 Under column base plates.
 20 Under beam setting plates.
 21 Under pre-cast concrete panels.
 22 Elsewhere shown on Drawings.

23
 24 STANDARD GROUT
 25 Parts by volume:
 26 Cement 1
 27 Lime 1/4
 28 Fine Aggregate 3
 29 Pea Gravel, as graded below 1 1/2
 30 Sieve Size % Passing
 31 3/8 95-100
 32 #3 45-75
 33 #4 10-20
 34 #8 0-5

35 Water: Minimum amount to produce 2500 psi compressive strength at 28 days, and to provide pouring
 36 consistency without aggregate segregation.
 37 Provide around pipes, conduit and ducts passing through floors and walls, and elsewhere necessary to
 38 prevent air and sound passage through walls and floors.

39
 40 FLOOR FILLER
 41 Dowman "Fix-All", or accepted substitute.
 42 Provide over concrete floor slabs which are too rough or uneven to provide satisfactory base for resilient
 43 covering or carpeting.

44
 45 CURING AND HARDENING COMPOUNDS
 46 Interior Flatwork to receive Finish Covering:
 47 Clear, colorless, with fugitive dye, approved by covering contractor; meet or exceed ASTM C 309, Type 1.
 48 Interior Flatwork without Finish Covering:
 49 Water-based chemical hardener; Dayton Superior "Day-Chem Hardener J-15", Tamms "Hornolith," Euclid
 50 "Surfhard", Sonneborn "Lapidolith," Nox-crete "Harbeton," Masco Cure & Seal 1310.
 51 Do not apply curing compound to surfaces scheduled to receive ceramic or stone tile. Wet cure only.
 52 Exterior Flatwork:
 53 Non-yellowing, resin cure, water-based, meet or exceed ASTM C 309, Type 1, Class A and B; Tamms
 54 "Horncure WB 100", Dayton Superior "Day-Chem Rez Cure J-11-W", BASF "Master Cure 100", W.R.
 55 Meadows "1100 Clear", Euclid "Kurex VOX", Masco Cure & Seal 1310.

56
 57 OTHER INGREDIENTS
 58 Conform to Building Code.

59

HARDENED/ GROUND/ POLISHED ARCHITECTURAL CONCRETE SLABS

Location: On-grade and elevated exposed floor slabs in locations where shown or scheduled on Drawings.

Description: Intent is to provide low-shrinkage, non-cracking horizontal slabs appropriate for exposed, hardened, ground and polished architectural finish.

Work of this section includes:

Coordination with requirements of Section 03 35 15 - Ground Concrete Finish.

Provision of finish-ready concrete slabs meeting the requirements.

Reinforcing, mix design, admixtures, curing and other treatments particular exposed, hardened, ground and polished concrete slabs.

Special attention to placement, configuration and execution of control joints as indicated.

Provide mock-up for approval of Architect. Refer to Mock-up paragraphs above.

CONCRETE MIX DESIGN

General:

Conform to ACI Code 318-02 and 201 OSSC Section 1905.

Selection of concrete proportions shall be based on required average compressive strength of concrete f'_{cr} stated in table below unless concrete production facility has 15 or more test records meeting the requirements of ACI-11 5.3.1.

Documentation that proposed concrete proportions will produce an average compressive strength equal to or greater than required average compressive strength f'_{cr} shall consist of more than 30 but not less than 10 consecutive test records which encompass a period of time not less than 45 days. Such records shall represent materials and conditions similar to those expected. When an acceptable record of field test results is not available, concrete proportions may be established based on trial mixtures meeting the requirements of ACI-11 5.3.3.2.

Concrete Strength and Minimum Cement Content:

Location	f'_{c}	Max w/c ratio	Min. cement (sacks/cu. yd.)
Slabs-on-grade, Curbs	3500 psi	0.44	5.5
Elevated Slabs, Walls	4000 psi	0.42	6.0
Footings, all other	3000 psi	0.46	5.0

Note: One sack of cement equals 94 lbs.

Engineer may order cement content for any class of concrete to be increased over the quantity specified if determined that such increase is necessary to attain required strength. Increased quantities of cement ordered to be furnished by contractor at no additional cost to owner.

Air Entrainment:

Footings: 2% to 4% of concrete volume.

Walls, Exterior Slabs: 4% to 6% of concrete volume.

Concrete Slump:

Minimum: 2 inches.

Slabs-on-grade, Curbs: Maximum 4 inches, 7 inches maximum with plasticizers.

Elevated Slabs, Walls: Maximum 4 inches, 5 inches maximum with plasticizers.

Footings: 6 inches.

Verify that design mix test results reflect the slumps to be used and adequate slump is produced to properly transport and place the mix.

PART 3 - EXECUTION

EXISTING CONDITIONS

Verify that formwork, reinforcement, and embedded items are accurately and securely placed, clean, water and frost-free, and ready to receive concrete.

Verify that vapor retarder is not punctured or otherwise damaged. Repair all damage.

Remove water from vapor retarder with portable high-speed air blowers just prior to slab-on-grade pour.

Prior to starting work notify General Contractor of defects requiring correction.

Do not start work until conditions are satisfactory.

SURFACE PREPARATION

Remove foreign matter from surfaces and areas to receive concrete.

If vapor retarder is wet, blow water off with power blower.

Sprinkle subgrades and other porous surfaces with water to eliminate suction.

1 Install slab-on-grade screeds without penetrating vapor retarder.

2

3 PLACING

4 Convey and place by methods which will prevent material separation and loss.

5 Deposit continuously, or in layers that will not form seams or weakened planes; where seams or
6 weakened planes are unavoidable provide construction joints as specified hereunder.

7 Do not convey pneumatically placed concrete through aluminum pipe.

8 Do not retemper or use set concrete.

9 Maximum height of vertical drop without use of trunk, placement ports in sides of formwork, or other
10 approved method is five (5) feet. When under-water concrete placement is approved, deposit fresh
11 concrete into mass of previously placed concrete causing water to be displaced with minimum concrete
12 surface disturbance.

13

14 COMPACTION

15 Employ mechanical high frequency vibrators to consolidate concrete around reinforcement, into corners
16 and angles of forms, and to exclude rock pockets, air bubbles, and honey comb.

17 Hold vibrator in one spot no longer than 30 seconds; keep in constant motion, insert and withdraw at
18 points approximately 18 inches on center.

19 Maintain vibrator in vertical position when penetrating concrete.

20 Transporting concrete with vibrator not permitted.

21 Maintain spare vibrator at jobsite during concrete placement.

22

23 CURING

24 Curing Period:

25 Not less than 7 days at 50°F minimum.

26 Walls, Beams and Columns:

27 Keep wet at least 14 days following concrete placement.

28 Exterior Flatwork:

29 Treat with curing compound applied immediately after slabs are finished in accordance with
30 manufacturer's directions.

31 Interior Flatwork:

32 Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature
33 drying, excessively hot or cold temperatures, and mechanical injury.

34 Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for
35 hydration of cement and hardening of concrete.

36 Avoid alternate wetting and drying and fluctuations of concrete temperature.

37 Curing compound prohibited at interior slabs-on-grade installed over vapor retarder.

38 Moist cure interior slabs-on-grade installed over vapor retarder only when weather conditions involve high
39 temperatures, wind, or both. Moist cure for minimum 48 hours.

40 Cure concrete slabs scheduled to receive ceramic tile by keeping the surface continuously moist for
41 minimum 48 hours. Do not use curing compounds.

42 Immediately prior to occupancy clean interior floors to remain exposed and treat with hardener.

43 Interior Flatwork to receive Polished Concrete Floor Finish:

44 Begin curing as soon as possible but no later than 3 hours after finishing operations have been
45 completed.

46 Curing compound prohibited at interior slabs-on-grade installed over vapor retarder.

47 Wet cure slabs according to ACI 308R-01.

48 Do not apply densifiers or hardeners.

49 Avoid exposure to wind during initial 7 day curing period. Provide curtains for wind protection.

50

51 CONSTRUCTION JOINTS IN WALLS, BEAMS, AND COLUMNS, unless otherwise shown on Drawings:

52 At Beams:

53 Locate at mid-span or at support centerline.

54 At Walls and Columns:

55 Locate at top of footings.

56 Locate at underside of overhead slabs and beams.

57 At exposed horizontal joints apply 2 x 4 wood strip level to inside of form cast against exposed concrete
58 face. Stop concrete pour approximately 1/2 inch above lower edge of strip.

59 Keyed Joints:

1 1 1/2 inches deep, minimum.
2 Provide at joints in walls and at joints between walls, slabs, stairways, and footings.

3 Reinforcement:

4 Continue across joints, unless otherwise shown on Drawings.

5 Water Stops:

6 Provide stops, as specified in Section 03100, across all basement wall joints.

7

8 **CONSTRUCTION JOINTS IN FLATWORK**

9 General:

10 Form to true, straight lines, with slabs flush at joints.

11 Locate under walls wherever possible.

12 At Ground Supported Flatwork:

13 Do not extend reinforcement through joints, unless otherwise shown on Drawings.

14 Key adjacent joints.

15 Spacing:

16 At Interior Flatwork:

17 Maximum spacing, unless otherwise shown on Drawings:

18 At uncovered Flatwork: 25 ft. apart, both ways.

19 At covered Flatwork: Contractor's choice, 25 feet apart in each direction maximum.

20 At Exterior Flatwork:

21 Maximum spacing, unless otherwise shown on Drawings:

22 At Walks and Drives: 15 ft. apart, both ways.

23 At Curbs: 30 ft. apart.

24 Fill alternate joints and joints where flatwork abuts vertical construction with expansion joint filler.

25 At Flatwork not supported by Ground:

26 Spacing: See Drawings.

27 Key adjacent joints, except over flatwork supports.

28 Extend reinforcing through joints, unless otherwise shown on Drawings.

29

30 **CRACK CONTROL JOINTS IN FLATWORK**

31 General:

32 Form to true, straight lines, with slabs flush at joints.

33 Spacing:

34 At Interior Flatwork to receive Polished Concrete Floor Finish:

35 Maximum spacing, unless otherwise shown on Drawings: 12 ft. apart, both ways.

36 Saw-cut control joints in slab as soon as possible after finishing. Use saw blade with triangular arbor configuration similar to Soff-cut V-blades to reduce edge leveling and dislodging aggregate.

37 At Interior Flatwork Elsewhere:

38 Maximum spacing, unless otherwise shown on Drawings:

39 At uncovered Flatwork: 25 ft. apart, both ways.

40 At covered Flatwork: Contractor's choice, 25 feet apart in each direction maximum.

41 At Exterior Flatwork:

42 Maximum spacing, unless otherwise shown on Drawings:

43 At Walks and Drives: 15 ft. apart, both ways.

44 At Curbs: 30 ft. apart.

45

46 **FINISHING FORM TIE HOLES**

47 After form tie removal fill holes with standard grout mixed as dry as feasible, and ram solid. Form tie holes which are not exposed to final view need not be grouted unless concrete is scheduled to receive dampproofing or waterproofing.

48

49 **VOIDS AND GRAVEL POCKETS**

50 Repair as directed wherever, in Architect's opinion, it is necessary.

51

52 **EXPOSED CONCRETE WALL FINISHES**

53 Formed Surfaces Exposed to View:

54 Knock fins off; patch imperfections to match adjacent surfaces.

55 Leave surfaces clean and smooth.

56 Concrete to receive Plaster or Skim Coat:

57

- 1 Knock fins off smooth, patch imperfections to match adjacent surfaces.
- 2 Leave surface straight and clean to satisfaction of plastering contractor.
- 3 Unformed Surfaces Exposed to View:
- 4 Finish as required to match adjacent surface, unless shown otherwise.
- 5
- 6 **CONCRETE SLAB FINISHES**
- 7 General:
- 8 Screed all slabs, for whatever finish, to true levels or slopes.
- 9 Bull-Floated Surface:
- 10 Provide, to insure bond, wherever applied ceramic or quarry tile are indicated on Drawings or specified.
- 11 Non-Slip Finish:
- 12 Screed and tamp to bring fine particles to surface.
- 13 Float with wood or carpet float to true surfaces.
- 14 Slightly roughen surfaces with hair broom ****before ****after **** tooling edges.
- 15 Mark off slabs as shown or directed; round edges to 1/4 inch radius.
- 16 Provide at exterior driveways and walks unless otherwise indicated.
- 17 Separate Cement Topping:
- 18 Preparation of slabs:
 - 19 Roughen slabs by picking if necessary for bond.
 - 20 Brush off loose particles with broom or wire brush
 - 21 Remove oil and grease with 10 percent muriatic acid solution.
 - 22 After cleaning, wet down with pressure hose; keep wet for 6 hours.
 - 23 Allow slab to dry until surface water disappears.
 - 24 Coat with bonding agent in accordance with manufacturer's directions.
- 25 Topping:
 - 26 One pound Portland Cement, one pound sand, 1 1/2 pounds 1/8 to 3/8 inch pea gravel, sufficient
 - 27 water for plastic consistency.
 - 28 Apply over thin coat of cement grout.
 - 29 Broom grout into surface short distance ahead of toppings.
 - 30 Spread topping evenly to thickness indicated; trowel as specified above.
- 31 Exposed Aggregate:
- 32 Level off and bull float slab to true surface.
- 33 After initial set, brush and wash off matrix carefully, exposing aggregate approximately 1/16 inch.
- 34 After final curing, clean surface with 10 percent muriatic acid solution.
- 35 Rinse with clean water.
- 36 Troweling:
- 37 At interior slabs-on-grade installed over vapor retarder: Provide single finish troweling.
- 38 Elsewhere: Double trowel by hand or machine to hard, dense surface, free from trowel marks.
- 39 Do not absorb wet spots with Neat cement or mixture of cement and sand.
- 40 Wait until surfaces are dry enough for proper troweling.
- 41 Chemical dryers not permitted.
- 42 Trowel floors level to true slopes.
- 43 Provide at all concrete slabs unless otherwise noted.
- 44 Slopes to Drains:
- 45 True to line, evenly graded, 1/8 inch per foot unless otherwise shown on Drawings.
- 46
- 47 **NON-SHRINK GROUT**
- 48 Follow manufacturer's directions. Do not retemper set grout.
- 49 Saturate concrete contact surfaces prior to grouting; remove excess water.
- 50 Thoroughly compact grout free of air pockets. Do not vibrate.
- 51 Do not remove leveling shims, if any, until 48 hours after grout placement.
- 52 After shim removal fill voids with standard grout.
- 53 After grout which is exposed to final view has reached initial set, rake out exposed edges approximately
- 54 one inch and point with mortar as follows: 1 part portland cement, 2 parts sand, and 1/2 part water by
- 55 weight.
- 56 Cure with moisture for 24 hours minimum.
- 57
- 58 **STANDARD GROUT**
- 59 Saturate concrete contact surfaces prior to grouting. Remove excess water.

1 Thoroughly compact grout free of air pockets. Do not vibrate.
2 Cure with moisture for 24 hours minimum.
3 Do not retemper set grout.

4
5 **FLOOR FILLER**

6 Prime floor with asphalt emulsion prior to filler application.
7 Mix filler with asphalt emulsion as required to improve bond.

8
9 **TOLERANCES**

10 Troweled Surfaces: True within 1/8 inch per 10 ft.
11 Non-Slip Surfaces: True within 1/4 inch per 10 ft.
12 All Other Surfaces: True within 1/4 inch per 2 ft.
13 Construct slab-on-grade and shored elevated floor slabs with an overall Floor Flatness and Floor
14 Levelness as follows, measured in accordance with ASTM E 1155/ASTM E 1155M:
15 Areas that are exposed, receive thin-set tile or resilient flooring:

16 Slab-on-Grade:
17 Overall Value: FF36/FL20.
18 Minimum Local Value: FF24/FL15.

19 Level suspended slabs:
20 Overall Value: FF30/FL20.
21 Minimum Local Value: FF24/FL15.

22 Areas that are scheduled to receive Polished Concrete Floor Finish:

23 Slab-on-Grade:
24 Overall Value: FF50/FL30.
25 Minimum Local Value: FF35/FL20.

26 Level suspended slabs:
27 Overall Value: FF50/FL30.
28 Minimum Local Value: FF35/FL20.

29 Other areas not listed above:

30 Slab-on-Grade:
31 Overall Value: FF25/FL20.
32 Minimum Local Value: FF217/FL15.

33 Level suspended slabs:
34 Overall Value: FF25/FL20.
35 Minimum Local Value: FF17/FL15.

36 Conform to ASTM E 1155 for determination of FF/FL numbers.
37 Remedial Measures for Non-conforming Slabs: Submit remediation plan to Architect for review and
38 approval.

39
40 **FIELD QUALITY CONTROL**

41 Tests:

42 Average minimum test results for lab-cured concrete cylinders, compression:

43 Design Strength	Lab-Cured Value
44 3,000 psi	3,750 psi
45 3,500 psi	4,400 psi
46 4,000 psi	5,000 psi

47 If a test cylinder shows manifest evidence of damage, improper sampling, molding, or testing, it shall be
48 discarded and the remaining cylinders strengths averaged.

49 During the progress of the work, if lab-cured values shown for each concrete design strength and quality
50 as determined by compression test cylinders and tests fail to attain the requirements specified, suspend
51 all concrete work until new mixes are designed and reviewed as outlined.

52 Concrete that has been placed and does not meet specified requirements will be reviewed by the
53 Architect and Contractor.

54 Any field testing such as core drilling required to verify in-place concrete strengths shall be at the
55 Contractor's expense.

56 Correct or remove defective work in a manner approved by the Architect with no additional cost to the
57 Owner.

58 Inspection:

59 Notify Architect at least 24 hours before intended concrete placement.

CAST-IN-PLACE CONCRETE

03 30 00-9

- 1 Place no concrete until formwork and reinforcement have been inspected.
- 2
- 3 **DEFECTIVE WORK**
- 4 Remove and replace, when directed by Architect, loose topping, surfaces which show excessive cracks,
- 5 any slabs which do not drain properly, and other defective concrete. On surfaces scheduled to receive
- 6 floor or wall coverings remove, by grinding if necessary, defects of magnitude to show through covering.
- 7 Remove honeycombed and other defective concrete down to sound concrete. If chipping is necessary,
- 8 shape edges perpendicular to surface or slightly undercut.
- 9 Feathered edges not permitted.
- 10
- 11 **CLEANING AND REPAIRING**
- 12 Remove debris from project site upon work completion or sooner, if directed.
- 13 Including work of other sections, clean, repair and touch-up, or replace when directed, products which
- 14 have been soiled, discolored, or damaged by work of this section.
- 15
- 16 **PROTECTION**
- 17 Protect work specified herein against damage and discoloration.
- 18 Protect other work against damage and discoloration caused by work of this section.
- 19
- 20
- 21

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Mortar materials, admixtures, and grout used in the installation of unit masonry.

5
6 **REFERENCES**

7 Mortar for Unit Masonry: ASTM C 270.
8 Grout for Reinforced and Non-reinforced Masonry: ASTM C 476.

9
10 **SUBMITTALS**

11 Provide in accordance with Section 01 33 00.
12 Design Data: Mortar and grout design mix formulas.

13
14 **QUALITY ASSURANCE**

15 If ready-mixed mortar is used, provide certificate from the mixing plant attesting that the delivered mortar
16 conforms to the design mix specifications.

17
18 **DELIVERY, STORAGE, AND HANDLING**

19 Protect against damage, contamination, and discoloration.
20 Store unmixed materials off ground, and under protective cover.
21 Remove unacceptable materials from site immediately.

22
23 **ENVIRONMENTAL REQUIREMENTS**

24 During Rainy Weather:

25 Work only under cover.

26 During Cold Weather:

27 Perform no work unless approved means for heating materials is provided, and masonry is protected

28 against frost until mortar has set.

29 Do not use anti-freeze ingredients.

30 When Air Temperature is between 40°F and 32°F:

31 Heat mixing water to maintain mortar at 70°F - 120°F until used.

32 After work day: Cover materials and completed work with canvas or polyethylene film to protect work

33 against freezing and wetting.

34 When Air Temperature is between 32°F and 25°F:

35 Heat mixing water and aggregate to maintain mortar at 40°F - 120°F until used.

36 When wind velocity exceeds 15 mph during work day: Protect work with windbreaker.

37 After work day: Cover materials and completed work with canvas or polyethylene film to protect work

38 against freezing and wetting.

39 When Air Temperature is between 25°F and 20°F:

40 In addition to the above requirements, maintain mortar on mortar boards above 40°F.

41 Maintain materials and completed work above freezing for at least 48 hours by using auxiliary heat and/or

42 insulating blankets.

43 When Air Temperature is below 20°F:

44 In addition to the above requirements, enclose materials and completed work, and maintain enclosed air

45 temperature above 40°F for at least 48 hours.

46 During Hot Weather:

47 Protect work against wind velocity exceeding 15 mph and against direct sun exposure when air

48 temperature exceeds 90°F in shade with less than 50% relative humidity.

49 When Work is not in progress, including shutdowns between each day's work:

50 Cover wall tops with non-staining, waterproof covering; extend covering 2 ft. minimum down both faces of

51 wall and secure in place.

52 When work is resumed:

53 Remove any loose mortar from work surfaces, dampen surface if necessary and when directed.

54
55 **COORDINATION**

56 Coordinate with other trades affecting or affected by work of this section.

57
58 **PART 2 - PRODUCTS**

- 1 CEMENT
2 Portland cement in conformance with ASTM C 150, Type I, except Type III may be used in cold weather.
3 Provide natural color or white cement as required to produce specified color. Use only 1 brand at
4 exposed work.
5
- 6 MASONRY CEMENT
7 Do not use "masonry cement" in any location for entire project.
8
- 9 LIME
10 Hydrated type conforming to ASTM C 207, type S, special finishing hydrated lime, non-air entrained. Use
11 only 1 brand at exposed work.
12
- 13 MORTAR AGGREGATE
14 Standard masonry type, clean, dry natural sand or manufactured sand conforming to ASTM C 144 or
15 ASTM C 404, size #2, except for joints 1/4 inch and less use aggregate graded with 100% passing the
16 No. 16 sieve.
17
- 18 GROUT AGGREGATE
19 Course: ASTM C 404, size #8 or size #89.
20 Fine: Sand, ASTM C 33 or ASTM C 404, size #1.
21
- 22 PREMIX MORTAR
23 ASTM C 387, using natural color or white cement as required to provide the specified color.
24
- 25 WATER
26 Clean, potable and free of deleterious material.
27
- 28 ADMIXTURES
29 Accelerator:
30 Sonneborn "Trimix," "Anti-Hydro," or accepted substitute.
31 Retardant:
32 Sonneborn "Sonotard," Sika "Plastiment," Protex, or accepted substitute.
33 Calcium Chloride and Anti-Freeze:
34 None permitted in any location for the entire project.
35
- 36 MORTAR COLORS
37 Pure inorganic natural clay or mineral oxide, manufactured by EnvironOxide Pigments, Solomon Colors,
38 Davis Colors, or accepted substitute.
39 Harmless to mortar set and strength.
40 Stable at high temperature.
41 Sunlight and alkali-fast.
42
- 43 INTEGRAL WATER REPELLANT
44 Liquid polymeric admixture conforming to ASTM E 514 for water penetration resistance; W.R. Grace &
45 Co. "Dry Block" mortar admixture.
46
- 47 MASONRY CLEANER
48 "Sure Klean" or approved specific product recommended by manufacturer for cleaning new and existing
49 concrete masonry units.
50
- 51 MASONRY WATER-REPELLENT SEALER
52 "Sure Klean" or approved specific product recommended by manufacturer for sealing new masonry units.
53
- 54 MORTAR AND GROUT MIXES
55 General:
56 Assume responsibility for mix design and product performance.
57 Measure materials by volume; do not measure by shovel-load.
58 Mix proprietary products in accordance with manufacturer's directions.
59 Mix all other mortars in mechanical batcher for 3 to 5 minutes.

- 1 Use water necessary for desired workability and required compressive strength.
- 2 Do not use mortar or grout which has begun to set or if more than one hour has elapsed after initial
- 3 mixing.
- 4 Admixtures:
- 5 Add accelerator and retardant to mortar where required by weather conditions.
- 6 Mortar:
- 7 Type "M", 2500 psi, for reinforced or below grade masonry, by volume:
- 8 Component Proportion by Volume
- 9 Portland Cement One (1)
- 10 Hydrated Lime one quarter (1/4)
- 11 Masonry Aggregate not less than two and one quarter (2-1/4) or more than three (3)
- 12 times the sum of the volumes of Cement and Lime used.
- 13 Type "S", 1800 psi, for veneer systems, by volume:
- 14 Component Proportion by Volume
- 15 Portland Cement One (1)
- 16 Hydrated Lime one quarter (1/4) to one half (1/2)
- 17 Masonry Aggregate not less than two and one quarter (2-1/4) or more than three
- 18 (3) times the sum of the volumes of Cement and Lime used.
- 19 Type "N", 750 psi, for interior, non-bearing and below grade, by volume:
- 20 Component Proportion by Volume
- 21 Portland Cement One (1)
- 22 Hydrated Lime one quarter (1/4) to one and one quarter (1-1/4)
- 23 Masonry Aggregate not less than two and one quarter (2-1/4) or more than three (3)
- 24 times the sum of the volumes of Cement and Lime used.
- 25 Setting mortar for mortared-in-place pre-cast concrete panels:
- 26 Component Proportion by Volume
- 27 Portland Cement One (1)
- 28 Hydrated Lime, Type "S" one tenth (1/10)
- 29 Masonry Aggregate Three (3)
- 30 Natural color pointing mortar:
- 31 Component Proportion by Volume
- 32 White Portland Cement One (1)
- 33 Lime Putty one eighth (1/8)
- 34 Silica Sand 80 mesh three (3) to four (4)
- 35 Grout:
- 36 In accordance with ASTM C 476 and the following:
- 37 Course grout where specified:
- 38 Component Proportion by Volume
- 39 Portland Cement one (1)
- 40 Lime zero (0) to one tenth (1/10)
- 41 Fine Aggregate (Sand) two and one quarter (2-1/4) to three (3) times the sum of the
- 42 volumes of cement and lime materials
- 43 Course Aggregate one (1) to two (2) times the sum of the volumes of cement and
- 44 lime materials.
- 45 Fine Grout where specified:
- 46 Component Proportion by Volume
- 47 Portland Cement one (1)
- 48 Lime zero (0) to one tenth (1/10)
- 49 Fine Aggregate (sand) two and one quarter (2-1/4) to three (3) times the sum of the
- 50 volumes of cement and lime materials.

PART 3 - EXECUTION

EXAMINATION

Verify that mortar mixing equipment, surfaces, and tools are clean and free of contaminants. Do not proceed with mixing until conditions are acceptable.

INSTALLATION

Install mortar and grout in accordance with Section 04 20 00. Work grout into cores and cavities to eliminate voids. Do not displace reinforcing steel while placing grout.

- 1 ADDING ADMIXTURES
- 2 Color:
- 3 Add in proportions recommended by manufacturer, all exposed mortar.
- 4 Accelerator and Retardant:
- 5 Add in proportions recommended by manufacturer, to mixes where required by weather conditions.
- 6 Integral Water Repellant:
- 7 Agitate water repellant containers prior to use.
- 8 Add water repellant admixture to mix water prior to charging the mix. Reduce initial water used in mix as
- 9 recommended by water repellant manufacturer.
- 10 Add to mortar mix in proportions and dosage rate as recommended by manufacturer for type of mortar
- 11 used.
- 12
- 13 RE-TEMPERING
- 14 Retemper mortar only within one hour after initial mixing.
- 15
- 16 CLEANING AND REPAIRING
- 17 Including work of other sections, clean, repair and touch-up, or replace when directed, products which
- 18 have been soiled, discolored, or damaged by work of this section. During the tooling of joints, enlarge
- 19 any holes or voids completely fill with mortar. Point-up all joints at corners, openings and adjacent work
- 20 to provide neat, uniform appearance.
- 21 Remove debris from project site upon work completion or sooner, if directed.
- 22
- 23 PROTECTION
- 24 Protect other work against damage and discoloration caused by work of this section.
- 25
- 26
- 27

END OF SECTION

1 PART 1 - GENERAL

2
3 SECTION INCLUDES
4 Masonry units used as walls or partitions, load or non-loadbearing; single wythe, veneer, and cavity
5 construction; including related accessories.

6
7 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION
8 Anchor bolts, sheet metal flashing, hollow metal work.

9
10 SUBMITTALS
11 Submit in accordance with Section 01 33 00.
12 Samples:
13 Sample of colored and/or textured concrete masonry units.
14 Sample of brick units.

15
16 ENVIRONMENTAL CONDITIONS
17 Comply with those described in Section 04 05 13.

18
19 DELIVERY, STORAGE, AND HANDING
20 Protect against moisture, damage, and discoloration.
21 Store materials off ground.
22 Remove damaged or discolored materials from site immediately after detection.

23
24 COORDINATION
25 Coordinate with other trades affecting or affected by work of this section.
26 Obtain exact sizes of, and accurately build around, any built-in items.

27 PART 2 - PRODUCTS

28
29
30 BRICK
31 Conform to ASTM C 216, type FBX, Grade SW. Match existing in shape and appearance.

32
33 CONCRETE BLOCK
34 Type: Hollow core block conforming to ASTM C 90, Type 1, mediumweight.
35 Compressive Strength: ***1500 ***1700 psi minimum, per individual unit average net area.
36 Aggregates: Conform to ASTM C 331.
37 Sizes: 8x8x16, 8x8x8 basic sizes, and other sizes as detailed on Drawings.
38 Face Shell Thickness: 1-1/4" for nominal 8" wide and 1" for nominal 6" wide units.
39 Required Special Shapes: Provide matching bond beams and other special shapes as detailed or
40 required.
41 Face Texture and Color: Standard units without flutes or color.

42
43 INTEGRAL WATER REPELLANT
44 Liquid polymeric admixture conforming to ASTM E 514 for water penetration resistance; W.R. Grace &
45 Co. "Dry Block" concrete block admixture.

46
47 STEEL REINFORCING BARS
48 Furnish and install hereunder. Conform to requirements specified in Section 03 20 00, and herein.
49 Prefabricated welded wire reinforcement, truss design, hot-dipped galvanized finish; Dur-O-Wal Truss or
50 accepted substitute.

51
52 THROUGH-WALL FLASHING
53 Type: Copper with asphalt impregnated fabric backing both sides.
54 Size: 5 ounce.
55 Manufacturer: Afco Products, Inc., or accepted substitute.
56 Type: Type 304 stainless steel conforming to ASTM A167.
57 Thickness: 0.179 inch minimum.
58 Solder: Cadmium and lead-free silver solder conform to ASTM B32.

59

- 1 ANCHORS AND TIES
2 Ties:
3 3/16 inch diameter ASTM A 82 steel wire protected and hot-dip galvanized coating.
4 Anchors:
5 16 gauge corrugated sheet steel straps or 3/8 inch diameter steel bars, bolts, or rods shown on Drawings
6 or as required by conditions of use, and protected by hot-dip galvanized coating.
7 Fabrication:
8 Fabricate long enough to secure to structure and embed into masonry at least 2 inches.
9 Provide lateral masonry restraint while permitting free horizontal and vertical movement.
- 10
11 MORTAR DEFLECTION MATERIAL
12 Open mesh weave designed for suspension of mortar droppings in masonry cavities, 10" height,
13 thickness as required for masonry cavity, made of recycled polyester or high density polyethylene; Mortar
14 Net USA "Mortar Net" or accepted substitute.
- 15
16 CONTROL JOINTS
17 Molded Rubber, Hohmann & Barnard, Inc. RS Series Rubber Control Joint, or accepted substitute.
18 Provide where shown on Drawings.
- 19
20 PRE-FORMED WEEP HOLES
21 Type: Polypropylene, honeycomb design; Hohmann & Barnard, Inc. #QV – Quatro-Vent, or accepted
22 substitute.
23 Size: 3/8" x 2 1/2" x 3 3/8"
24 Color: Gray.
- 25
26 MASONRY CLEANER
27 Sure Klean, FabriKlean Type L, or approved specific product recommended by manufacturer for cleaning
28 new and existing concrete masonry units.
- 29
30 MASONRY WATER-REPELLENT SEALER
31 Clear, penetrating water-based silane siloxane blend, VOC compliant, compatible with concrete block and
32 mortar water repellent admixtures, conforming to ASTM E 514 for water penetration resistance; W.R.
33 Grace "Infiniseal DB".
- 34
35 **PART 3 - EXECUTION**
- 36
37 EXAMINATION
38 Verify that surfaces to receive masonry are accurately sized and located, solid, level, dry, clean, and
39 otherwise properly prepared.
40 Prior to starting work notify General Contractor about defects requiring correction.
41 Do not start work until conditions are satisfactory.
- 42
43 PREPARATION
44 When humidity reaches 30% or less, soak brick to reduce initial absorption. Do not wet concrete block.
45 Remove dirt, ice, loose rust, and scale from anchors, ties, and reinforcement prior to setting masonry.
- 46
47 TOLERANCES
48 Unless otherwise specified, construct masonry work true within 1/8 inch per 10 ft.
49 Accurately size masonry openings within 1/4 inch plus or minus.
- 50
51 INSTALLATION
52 General:
53 Do not install cracked, broken, or chipped masonry units.
54 Use masonry saws to cut and fit exposed units.
55 Lay plumb, true to line, and with level courses accurately spaced within allowable tolerances.
56 Do not furrow bed joints.
57 Stop off horizontal run by racking back in each course; toothing not permitted.
58 Adjust units to final position while mortar is soft and plastic.
59 If units are displaced after mortar has stiffened, remove, clean joints and units of Mortar, and relay with

- 1 fresh mortar.
2 When joining fresh masonry to set or partially set masonry: Remove loose units and mortar.
3 Clean and lightly wet exposed surface of set masonry prior to laying fresh masonry.
4 Remove misplaced mortar and grout immediately.
5 Mortar Beds:
6 Fill joints with mortar, except:
7 Control joints and weep holes.
8 Joints in open-end hollow masonry units.
9 Space between wythes of cavity walls.
10 Space between masonry veneer and backing.
11 Take special care to keep above spaces clean and free from mortar droppings.
12 Where adjustment must be made after mortar has started to set, remove mortar and replace with fresh
13 mortar.
14 Laying Brick:
15 Lay units with running bond unless otherwise noted on Drawings. Saw cut all trimmed units. Units with
16 exposed open cells not permitted. Make joints uniform approximately 3/8 inch wide. Compress joints
17 with round tool.
18
19 ANCHORING
20 For Masonry Veneer on Frame Construction:
21 Provide one tie or anchor for no more than each 2 sq. ft. of wall area.
22 Maximum horizontal distance between ties and anchors: 24 inches.
23 For Wood Bucks:
24 Turn up one anchor end 2 inches minimum and spike securely onto buck and embed other end at least 2
25 inches into mortar.
26 Provide within 8 inches of tops and bottoms of bucks, not more than 2 feet apart between.
27
28 REINFORCING
29 Reinforced Hollow Cell Units:
30 Reinforce as shown on Drawings.
31 Provide horizontal bond beams where indicated.
32 Grout reinforced cells full.
33 Welded Wire Reinforcement:
34 Install wire reinforcing as recommended by manufacturer.
35 Place reinforcement directly on masonry and place mortar over wire to form bed joint.
36 Bend rods 90° around corners and lap with adjacent rods minimum 24 inches.
37
38 GROUTING
39 Assure that grout core is free of mortar droppings and other deleterious material.
40 Agitate or puddle grout during and after placement to insure complete filling.
41 Stop grout 1 1/2 inches below top of masonry when grouting is to be stopped for 1 hour or more.
42 Continue grouting to top of finished wall.
43 Maximum grout pour 4 feet high, unless otherwise approved and cleanouts provided.
44
45 SEALANT JOINTS
46 Provide 1/4 inch wide by 3/4 inch deep sealant openings around outside perimeters of exterior doors,
47 windows, louvers, and other masonry openings, unless otherwise shown on Drawings.
48
49 GROUTING HOLLOW METAL FRAMES INSTALLED IN MASONRY WALLS
50 Fill heads and jambs with grouting mortar specified in Section 04 05 13.
51
52 POINTING
53 Upon completion point exposed work of this section.
54 Fill holes and cracks.
55 Remove loose mortar, cut out defective Work and repoint where directed.
56 Remove mortar fins from joint junctions.
57
58 FIELD QUALITY CONTROL
59 Field measurements:

- 1 Verify prior to starting work.
- 2 If field measurements differ slightly from Drawing dimensions modify Work as required for accurate fit. If
- 3 measurements differ substantially notify Architect prior to fabrication.
- 4 Inspection:
- 5 Notify Architect, at least 24 hours before grout placement. Place no grout until reinforcement has been
- 6 reviewed and accepted.

- 7
- 8 **CLEANING AND REPAIRING**
- 9 Remove mortar and stains from exposed masonry surfaces.
- 10 Unless otherwise approved, clean interior masonry before installing finish materials.
- 11 Delay cleaning until masonry is dry.
- 12 Prior to cleaning remove excess mortar by scraping using brass, nylon, or other non-ferrous devices only.
- 13 Mask or otherwise protect vegetation, metalwork, and other materials damageable by cleaning agents.
- 14 Prior to applying fluid cleaning agents saturate masonry with clean water.
- 15 Unless otherwise approved, do not use muriatic or other acid type cleaning solutions.
- 16 Remove cleaning agents from masonry following cleaning.
- 17 Follow manufacturer's instructions for applying and removing cleaning agents.
- 18 Leave masonry surfaces ready to receive dampproofing specified in Section 07150.
- 19 Including work of other sections, clean, repair and touch-up, or replace when directed, products which
- 20 have been soiled, discolored, or damaged by work of this section.
- 21 Remove debris from project site upon work completion or sooner, if directed.

- 22
- 23 **PROTECTION**
- 24 Protect other work against damage and discoloration caused by work of this section.
- 25 Protect masonry against damage until mortar has set.
- 26 Protect sills, ledges, and offsets against mortar droppings.

27
28
29
30

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES

4 Shop fabricated structural steel framing members including supports, bracing, struts, welds and fasteners.

5
6 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

7 Anchor bolts and loose bearing plates.

8
9 REFERENCES

10 ASTM A 36: Structural Steel.

11 ASTM A 53: Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.

12 ASTM A 307: Low-Carbon Steel Externally and Internally Threaded Fasteners.

13 ASTM A 325: High Strength Bolts for Structural Steel Joints.

14 ASTM A 500: Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and
15 Shapes.

16 AWS D1.1: Structural Welding Code.

17 Follow AISC Specifications and Code of Standard Practice, except as modified by these Specifications.

18 Code may be obtained from Institute.

19
20 SUBMITTALS

21 Provide in accordance with Section 01 33 00.

22 Shop Drawings:

23 Indicate shop and erection details, including cuts, copes, connections, holes, threaded fasteners, and
24 welds.

25 Show critical dimensions, required clearances, construction details, installation methods including splices,
26 attachments, and anchoring.

27 Indicate shop and field welds by ASW A2.0 welding symbols. Indicate net weld lengths.

28 Furnish anchor bolt templates, setting drawings and installation details.

29
30 QUALIFICATIONS

31 Structural Steel Fabricator:

32 Not less than 5 years experience in work of this type.

33 Structural Steel Erector:

34 Not less than 5 years experience in work of this type.

35 Welders:

36 Qualified for welds to be performed in accordance with AWS Article 5 within previous year.

37
38 DELIVERY, STORAGE, AND HANDLING

39 Deliver to jobsite in accordance with approved schedule and in proper erection sequence.

40 Include all required bolts, and other fastening devices.

41 Store structural steel members above ground on platforms, skids, or other approved supports.

42 Store other materials in weather-tight and dry locations.

43 Store packaged materials in original unbroken containers.

44 Protect against corrosion and damage.

45
46 COORDINATION

47 Coordinate with other trades affecting or affected by work of this section.

48
49 **PART 2 - PRODUCTS**

50
51 STEEL SHAPES, BARS, AND PLATES

52 Conform to ASTM A 36.

53
54 STRUCTURAL STEEL PIPE

55 Conform to ASTM A 53, Type S where exposed to view and Type E elsewhere, Grade A.

- 1 STRUCTURAL STEEL TUBING
2 ASTM A 500, Grade B, fy: 46 ksi.
3
- 4 THREADED FASTENERS
5 Standard Strength Fasteners:
6 Bolts and Nuts: Conform to ASTM A 307, Grade A.
7 Plain Washers: Conform to ANSI B 27.2.
8 High Strength Fasteners:
9 Nuts and Bolts: Conform to ASTM A 325, Type 1.
10
- 11 ANCHOR BOLTS
12 Conform to ASTM A 307, Grade A.
13
- 14 CONCRETE EXPANSION ANCHORS
15 Hilti Kwik Bolt III, or accepted substitute.
16
- 17 FABRICATION
18 General:
19 Fabricate connections not specifically detailed on Drawings consistent with balance of design and strong
20 enough to develop fully members involved.
21 Stress relieve welded assemblies by heat treatment.
22 Form to accurate sizes and shapes, with sharp lines and angles, and in accordance with AISC Minimum
23 Fabrication Standards.
24 Punch and shear to leave clean surfaces.
25 Weld permanent connections; grind exposed welds smooth. Ease exposed edges to small uniform
26 radius.
27 Provide holes and connections for work of other trades.
28 Cut abutting structural members to fit with full bearing contact.
29 Miter and cope member intersections within 2°, fit to within 0.02 inches, and weld all around.
30 Where exposed to weather, form to exclude water; allow for expansion and contraction.
31 Do not use screws or bolts when they can be avoided; when used, countersink heads, draw up tight, and
32 nick threads to prevent loosening.
33 Columns:
34 Fabricate columns of single piece, full length. Shop fabricate with base plates, column caps, and other
35 members.
36 Bearing and Base Plates:
37 Provide bearing plates under footings, piers, walls, and where indicated on Drawings.
38 Plates attached or shipped loose at Contractor option.
39
- 40 FINISHING
41 Before treating metal fabrications, remove grease, oil, dirt, loose rust, loose mill scale, and any other
42 bond-reducing materials.
43 Do not prime galvanized steel, surfaces encased in concrete, surfaces to be welded, and contact
44 surfaces to be connected with high strength friction type bolts.
45 Prime paint other surfaces with fabricator's standard rust inhibiting paint, medium dry film thickness: 1.0
46 mils.
47
- 48 TOLERANCES
49 Maximum deviation of individual members from dimensions shown on Drawings as follows:
50 Overall length of members with both ends finished for compact bearing: 1/32 inch.
51 Overall length of members without finished ends:
52 For members up to 30 ft. long: 1/16 inch.
53 For members over 30 ft. long: 1/8 inch.
54 Compressive member straightness: 1/1000 of axial length between lateral support points.
55 Twist, bends, kinks: Unacceptable.
56
57

PART 3 - EXECUTION**EXAMINATION**

Verify that surfaces to receive structural steel are accurately sized and located, sound, true, even, and otherwise properly prepared.

Prior to starting work notify General Contractor about defects requiring correction.

Do not start work until conditions are satisfactory.

PREPARATION

Verify field measurements prior to fabrication.

If field measurements differ slightly from Drawing dimensions modify work as required for accurate fit. If measurements differ substantially notify Architect prior to fabrication.

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for their installation. Coordinate delivery of such items to project site.

BEARING AND BASE PLATE INSTALLATION

Set plates attached to members.

Align and level with leveling nuts.

STRUCTURAL STEEL ERECTION

Follow AISC Specifications specified above, except as modified herein.

Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.

Clean contacting bearing surfaces prior to assembling.

Accurately assemble to lines and elevations indicated.

Bring abutting surfaces of compression members into contact prior to fastening splices.

Prior to fastening align and adjust frame components within specified erection tolerances.

Splices permitted only where indicated.

Erection bolts used in welded construction may be tightened and left in place, or removed and holes plug-welded at Contractor's option.

Field cutting or alteration of structural members permitted only with Architect's approval.

STRUCTURAL STEEL ERECTION TOLERANCES

Maximum deviation of individual members from plumb, level, or true alignment: 1/8 inch per story.

Column centerline displacement of exterior columns not more than 1 inch inward nor 2 inches away from building line at any point.

FIELD INSPECTION

Do not remove staging or platforms before field connections are inspected or tested.

Do no welding until surface to be welded and filler metal to be used have been inspected and approved.

Refer to Section 01 45 00 for inspection and testing details.

TOUCH-UP PAINTING

Touch up field connections and damaged shop treatment areas as erection proceeds.

Immediately prior to final covering remove rust and retreat any structural steel members showing evidence of rust through shop treatment over approximately 25% or more of total shop treatment areas.

CLEANING AND REPAIRING

Remove loose rust, heavy mill scale, oil, dirt, and other bond-reducing foreign substances from members scheduled to receive finish painting.

Including work of other Sections, clean, repair and touch-up, or replace when directed products which have been soiled, discolored, or damaged by work of this section.

PROTECTION

Protect other work against damage and discoloration caused by work of this section.

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Light gage metal framing, fastening and accessories.

5
6 REFERENCES
7 Conform to the requirements of the Metal Stud Manufacturer's Association (MSMA) standard common
8 section designations.
9 Conform to the American Iron & Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel
10 Structural Members".
11 American Welding Society (AWS): AWS D1.1 Structural Welding Code.

12
13 SUBMITTALS
14 Provide in accordance with Section 01 33 00.
15 Indicate component details and accessories or items required of other work for complete installation.
16 Detail stud and joist layout.
17 Provide calculations for loading and stresses of framing members sealed by an Oregon registered
18 professional engineer.
19 Submit manufacturer's instructions for securing studs to tracks and for other framing connections.
20 Certificates:
21 Provide mill certificate indicating minimum chemical composition, yield strength, tensile strength,
22 elongation and coating thickness.

23
24 DELIVERY, STORAGE, AND HANDLING
25 Deliver products to site with manufacturer's original labels intact and legible.
26 Provide legible label, stamp, or embossment indicating manufacturer's name, logo, or initials, ICBO
27 evaluation service report number, material base metal thickness (uncoated) in thousandths of an inch,
28 and yield strength.
29 Do not overload floor or roof system with stockpiled materials.

30
31 COORDINATION
32 Coordinate with other trades affecting or affected by work of this section.

33
34 **PART 2 - PRODUCTS**

35
36 STEEL FRAMING SECTIONS
37 Galvanized Steel:
38 Conform to ASTM A 446.
39 12 Gage: Grade D (f_y=50 ksi).
40 14 and 16 Gage: Grade A (f_y=33 ksi).
41 18 Gage and lighter: Grade A (f_y=33 ksi).
42 Metal Finish: Galvanized in accordance with ASTM A 525.

43 Carbon Steel:
44 Conform to ASTM A 570.
45 12 Gage: Grade 50 ksi.
46 14 and 16 Gage: Grade 50 ksi or Grade 33 ksi.
47 18 Gage and lighter: Grade 33 ksi.
48 Coating: Rust-inhibiting primer.

49 Metal thickness:
50 As noted on Drawings.
51 Member Sizes and Gages:
52 As noted on Drawings.

53 Track:
54 Galvanized steel, channel shape, same width as studs for tight fit, solid web, 18 gage unless otherwise
55 shown on Drawings.

56
57 FASTENERS
58 Screws:
59 Self-tapping, self-drilling, length as required for installation, conforming to ASTM A 90, hot dip galvanized.

1 Conform to AISI Specification E4.

2 Powder-Actuated Fasteners:

3 Low velocity type, 0.145 inch diameter, 1 1/8 inch length, conforming to ICBO ES 2388; Hilti DN series, or
4 accepted substitute.

5

6 **ACCESSORIES**

7 Form of galvanized steel.

8 Provide all indicated or required for complete installation.

9

10 **FABRICATION**

11 Fabricate assemblies of sizes and profiles as shown on Drawings or as required, with joints fitted,
12 secured, reinforced, and braced to suit design requirements.

13

14 **PART 3 - EXECUTION**

15

16 **EXAMINATION**

17 Verify that surfaces to receive fold-formed steel framing are accurately located, plumb, square, true,
18 secure, and otherwise properly prepared.

19 Prior to starting work notify General Contractor of defects requiring correction.

20 Do not start work until conditions are satisfactory.

21

22 **INSTALLATION**

23 General:

24 Follow manufacturer's directions.

25 Install plumb, level, true, and in accurate locations indicated.

26 Form corners and intersection with three studs.

27 Locate studs two inches from internal corners.

28 Frame for openings.

29 Handle and lift prefabricated panels so that no distortion is caused to any member of the assembly.

30 Install framing between members for attachment of mechanical and electrical items.

31 Tracks and Runners:

32 Align tracks square and parallel, located to layout.

33 Secure to supporting structure as shown on Drawings.

34 Secure butt ends of adjacent tracks to common structural member, butt-welded or spliced.

35 Studs:

36 Install studs plumb, aligned and securely fastened to flanges of upper and lower tracks at spacings noted
37 on Drawings.

38 Connect studs to tracks using screws or welds as noted on Drawings.

39 Install jack studs below and above wall openings, and elsewhere to provide support for load-bearing
40 walls. Securely attach to connecting members.

41 Provide lateral bracing conforming to AISI Specification Section D3.

42 Provide for structural movement where indicated on Drawings.

43 Install load-bearing studs in one-piece lengths. Splices in axially loaded studs not permitted.

44 Joists:

45 Install joists parallel, level and true.

46 Locate joists directly over bearing studs.

47 Provide web stiffeners at bearing points where indicated on Drawings.

48 Provide bridging where indicated on Drawings.

49 Provide additional joists under parallel partitions and at openings in floor or roof framing that interrupt one
50 or more spanning members.

51 Provide blocking to restrain joist ends from rotation.

52

53 **CLEANING**

54 Including work of other sections, clean, repair and touch-up, or replace when directed products which
55 have been soiled, discolored, or damaged by work of this section.

56 Leave surface ready for finishing specified in other sections.

57 Remove debris from project site upon work completion or sooner, if directed.

58

59

COLD-FORMED METAL FRAMING

05 40 00-3

- 1 PROTECTION
- 2 Protect other work against damage and discoloration caused by work of this section.
- 3
- 4
- 5
- 6

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Shop fabricated metal items manufactured to conventional or standard details, galvanized or prime
5 painted. Includes metal, stairs, railings, ladders, gratings and castings.

6
7 **PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION**

8 Anchor bolts and loose bearing plates.

9
10 **REFERENCES**

- 11 ASTM A 36: Structural Steel.
- 12 ASTM A 53: Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- 13 ASTM A 307: Low-Carbon Steel Externally and Internally Threaded Fasteners.
- 14 ASTM A 325: High Strength Bolts for Structural Steel Joints.
- 15 ASTM A 500: Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and
- 16 Shapes.
- 17 AWS D1.1: Structural Welding Code.
- 18 Follow AISC Specifications and Code of Standard Practice, except as modified by these Specifications.
- 19 Code may be obtained from Institute.

20
21 **SUBMITTALS**

22 Provide in accordance with Section 01 33 00.

23 **Shop Drawings:**

- 24 Indicate shop and erection details, including cuts, copes, connections, holes, threaded fasteners, and
- 25 welds.
- 26 Show critical dimensions, required clearances, construction details, installation methods including splices,
- 27 attachments, and anchoring.
- 28 Indicate shop and field welds by ASW A2.0 welding symbols. Indicate net weld lengths.
- 29 Furnish anchor bolt templates, setting drawings and installation details.

30
31 **QUALIFICATIONS**

32 **Structural Steel Fabricator:**

33 Not less than 5 years experience in work of this type.

34 **Structural Steel Erector:**

35 Not less than 5 years experience in work of this type.

36 **Welders:**

37 Qualified for welds to be performed in accordance with AWS Article 5 within previous year.

38
39 **DELIVERY, STORAGE, AND HANDLING**

- 40 Deliver to jobsite in accordance with approved schedule and in proper erection sequence.
- 41 Include all required bolts, and other fastening devices.
- 42 Store structural steel members above ground on platforms, skids, or other approved supports.
- 43 Store other materials in weather-tight and dry locations.
- 44 Store packaged materials in original unbroken containers.
- 45 Protect against corrosion and damage.

46
47 **COORDINATION**

48 Coordinate with other trades affecting or affected by work of this section.

49
50 **PART 2 - PRODUCTS**

51
52 **STEEL SHAPES, BARS, AND PLATES**

53 Conform to ASTM A 36.

54
55 **STRUCTURAL STEEL TUBING**

56 ASTM A 500, Grade B, fy: 46 ksi.

57
58 **STANDARD STRENGTH THREADED FASTENERS**

59 Bolts and Nuts: Conform to ASTM A 307, Grade A.

1 Plain Washers: Conform to ANSI B 27.2.

2

3 **ANCHOR BOLTS**

4 Conform to ASTM A 307, Grade A.

5

6 **CONCRETE EXPANSION ANCHORS**

7 Hilti Kwik Bolt III, or accepted substitute.

8

9 **FABRICATION**

10 General:

11 Fabricate connections not specifically detailed on Drawings consistent with balance of design and strong enough to develop fully members involved.

12 Stress relieve welded assemblies by heat treatment.

13 Form to accurate sizes and shapes, with sharp lines and angles, and in accordance with AISC Minimum Fabrication Standards.

14 Punch and shear to leave clean surfaces.

15 Weld permanent connections; grind exposed welds smooth. Ease exposed edges to small uniform radius.

16 Provide holes and connections for work of other trades.

17 Cut abutting structural members to fit with full bearing contact.

18 Form elbows and bends to uniform radii, free from buckles and twists, with finished surfaces smooth.

19 Miter and cope member intersections within 2°, fit to within 0.02 inches, and weld all around.

20 Where exposed to weather, form to exclude water; allow for expansion and contraction.

21 Do not use screws or bolts when they can be avoided; when used, countersink heads, draw up tight, and nick threads to prevent loosening.

22 Bearing and Base Plates:

23 Provide bearing plates under footings, piers, walls, and where indicated on Drawings.

24 Plates attached or shipped loose at Contractor option.

25

26 **FINISHING**

27 Mill Mark Removal:

28 Allow no mill marks (stenciled, stamped, raised etc.) in exposed locations. Omit mill marks by cutting mill material to appropriate lengths where possible. Where not possible fill and/or grind to acceptable surface finish.

29 Cleaning:

30 Before treating metal fabrications, remove grease, oil, dirt, loose rust, loose mill scale, and any other bond-reducing materials.

31 Priming:

32 Do not prime galvanized steel, surfaces encased in concrete, surfaces to be welded, and contact surfaces to be connected with high strength friction type bolts.

33 Prime paint other surfaces with fabricator's standard rust inhibiting paint, medium dry film thickness: 1.0 mils.

34

35 **TOLERANCES**

36 Maximum deviation of individual members from dimensions shown on Drawings as follows:

37 Overall length of members with both ends finished for compact bearing: 1/32 inch.

38 Overall length of members without finished ends:

39 For members up to 30 ft. long: 1/16 inch.

40 For members over 30 ft. long: 1/8 inch.

41 Compressive member straightness: 1/1000 of axial length between lateral support points.

42 Twist, bends, kinks: Unacceptable.

43

44 **PART 3 - EXECUTION**

45

46 **EXAMINATION**

47 Verify that surfaces to receive fabricated steel are accurately sized and located, sound, true, even, and otherwise properly prepared.

48 Prior to starting work notify General Contractor about defects requiring correction.

49 Do not start work until conditions are satisfactory.

1 PREPARATION

2 Verify field measurements prior to fabrication.

3 If field measurements differ slightly from Drawing dimensions modify work as required for accurate fit. If
4 measurements differ substantially notify Architect prior to fabrication.

5 Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions
6 for their installation. Coordinate delivery of such items to project site.

7

8 BEARING AND BASE PLATE INSTALLATION

9 Set plates attached to members.

10 Align and level with leveling nuts.

11

12 STRUCTURAL STEEL ERECTION

13 Follow AISC Specifications specified above, except as modified herein.

14 Clean contacting bearing surfaces prior to assembling.

15 Accurately assemble to lines and elevations indicated.

16 Bring abutting surfaces of compression members into contact prior to fastening splices.

17 Prior to fastening align and adjust frame components within specified erection tolerances.

18 Splices permitted only where indicated.

19 Erection bolts used in welded construction may be tightened and left in place, or removed and holes
20 plug-welded at Contractor's option.

21 Correcting fabrication errors by gas-cutting permitted only with Architect's approval.

22

23 STRUCTURAL STEEL ERECTION TOLERANCES

24 Maximum deviation of individual members from plumb, level, or true alignment: 1/8 inch per story.

25 Column centerline displacement of exterior columns not more than 1 inch inward nor 2 inches away from
26 building line at any point.

27

28 FIELD INSPECTION

29 Do not remove staging or platforms before field connections are inspected or tested.

30 Do no welding until surface to be welded and filler metal to be used have been inspected and approved.

31 Refer to Section 01 45 00 for inspection and testing details.

32

33 TOUCH-UP PAINTING

34 Touch up field connections and damaged shop treatment areas as erection proceeds.

35 Immediately prior to final covering remove rust and retreat any structural steel members showing
36 evidence of rust through shop treatment over approximately 25% or more of total shop treatment areas.

37

38 CLEANING AND REPAIRING

39 Remove loose rust, heavy mill scale, oil, dirt, and other bond-reducing foreign substances from members
40 scheduled to receive finish painting.

41 Including work of other Sections, clean, repair and touch-up, or replace when directed products which
42 have been soiled, discolored, or damaged by work of this section.

43

44 PROTECTION

45 Protect other work against damage and discoloration caused by work of this section.

46

47

48

END OF SECTION

1 **PART 1 -GENERAL**

2
3 **SECTION INCLUDES**

4 Treatment of wood products to increase their durability against decay or retard burning characteristics.

5
6 **PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION**

7 Deliver to General Contractor sufficient preservative solution for field-cut treatments.

8
9 **REFERENCES**

10 Pressure Treatments specified hereunder refer to quality mark designations of American Wood Protection
11 Association, P.O. Box 361784, Birmingham, Alabama 35236-1784, and hereinafter referred to as AWPB.
12 Specifications may be obtained from Association.

13
14 **SUBMITTALS**

15 Certification:

16 Indicate moisture content of treated wood, chemical used, and retention obtained.

17
18 **DELIVERY, STORAGE, AND HANDLING**

19 Protect against damage, moisture, and discoloration.

20
21 **EXTRA MATERIAL**

22 Deliver to General Contractor sufficient brush treatment material for field-cut treatments.

23
24 **COORDINATION**

25 Protect other work against damage or discoloration caused by work of this section.

26
27 **PART 2 - PRODUCTS**

28
29 **PRESERVATIVE TREATMENT**

30 Provide AWPB, Standard P5, Use Standard UC4A, Copper Azole – Type B (CA-B) treatment using CA-B
31 dissolved in a solution of ethanolamine in water for wood preservative in the following locations:

32 In contact with masonry, concrete, roofing, and elsewhere shown on drawings.

33
34 **BRUSH TREATMENT MATERIAL**

35 Material: Recommended by preservative treatment manufacturer for application to field cut treated
36 lumber.

37 Treat any field cuts to pressure-treated wood.

38
39 **PART 3 - EXECUTION**

40
41 **EXAMINATION**

42 Verify that material to receive treatment does not exceed moisture content specified for similar untreated
43 wood.

44 Prior to starting work notify General Contractor of conditions requiring correction.

45 Do not start work until conditions are satisfactory.

46
47 **APPLICATION - PRESERVATIVE TREATED WOOD**

48 General:

49 Follow referenced specifications.

50 Incise members prior to treatment.

51 Field Cuts and Brush Treatment:

52 Apply 2 liberal coats of brush treatment material to field cut surfaces.

53
54 **PROTECTION**

55 Protect other work against damage or discoloration caused by work of this section.

56

57

58

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Construction of wood framework using lumber, plywood, and other sheathing materials. Miscellaneous
5 blocking and curbing, concealed wood framing and furring. Includes rough hardware to join members
6 and anchor framework.

7
8 QUALITY ASSURANCE

9 Framing Lumber:

10 Grade mark and trademark of association listed below and having jurisdiction must appear on each piece
11 of material.

12 On members scheduled to receive transparent finish do not place grade mark stamp where exposed to
13 view. In lieu thereof stamp where concealed, or submit Certificate of Inspection.

14 WWP: Western Wood Products Assn., 522 SW Fifth Avenue, Portland, OR 97204-2122.

15 APA: American Plywood Assn., 1119 A Street; Tacoma, WA 98401.

16 SUBMITTALS

17 Product Data:

18 Submit manufacturer's product data listing volatile organic compound (VOC) content of adhesives and
19 sealants.

20

21 DELIVERY, STORAGE, AND HANDLING

22 Protect against moisture, damage, and discoloration.

23 Do not store wood materials in wet or damp areas, or in contact with ground.

24 Avoid overloading floor and roof framing with stored materials.

25

26 COORDINATION

27 Coordinate with other trades affecting or affected by work of this section.

28

29 **PART 2 - PRODUCTS**

30

31 FRAMING LUMBER

32 Material:

33 Douglas fir, surfaced 4 sides to standard nominal dimensions except where rough sawn stock or special
34 shapes are indicated.

35 Grade:

36 Comply with current WWP Standard Grading Rules as follows:

37 Load-Bearing Studs, Roof and Floor Joists: No. 2 and better.

38 Beams, Ledgers and Columns: No. 1, free of heart center.

39 Other Framing Lumber: Standard and better.

40 Furring, Bracing and Blocking: Utility grade.

41 Maximum moisture content when delivered to project:

42 All wood materials: 19%.

43

44 PLYWOOD

45 US Product Standard 1-07, exterior type where exposed to moisture.

46 Each piece shall bear APA Grade mark.

47 Unless otherwise specified use Group 1 Douglas Fir; Grade "A" for exposed surfaces, "C" or better
48 elsewhere.

49

50 PLYWOOD ROOF SHEATHING

51 Grade: APA C-D, with exterior glue, Exposure 1.

52 Thickness: 3/4 inch

53 Span Rating: 40/20

54 Sheet Size: 48 x 96 inch size unless otherwise indicated.

55 Surface Finish: Unsanded.

56 Edges: Tongue and groove.

57

58 PLYWOOD SUBFLOORS

59 Grade: APA C-D grade, with exterior glue, Exposure 1.

ROUGH CARPENTRY

06 10 00-2

1 Thickness: 3/4 inch
2 Span Rating: 48/24
3 Sheet Size: 48 x 96 inch size unless otherwise indicated,
4 Surface Finish: Unsanded.
5 Edges: Tongue and groove.

6
7 PLYWOOD WALL SHEATHING
8 Grade: APA C-D with exterior glue, Exposure 1.
9 Thickness: 1/2 inch
10 Span Rating: 24/0
11 Sheet Size: 48 X 96 inch size, unless otherwise indicated.
12 Surface Finish: Unsanded.
13 Edges: Square.

14
15 PLYWOOD FLOOR DECKING
16 Grade: APA Rated Sturd-I-Floor
17 Thickness: 1-1/8 inch.
18 Span Rating: 48 on center.
19 Sheet Size: 48 x 96 inch unless otherwise indicated.
20 Surface Finish: Sanded.
21 Edges: Tongue & groove.

22
23 UNDERLAYMENT
24 Manufacturer: Weyerhaeuser "Versabord", US Ply "Novaply", Duraflake, or accepted substitute.
25 Thickness: 5/8 inch.
26 Minimum Density: 40 pcf.
27 Maximum urea formaldehyde resin emission: 1.8 ug/ml per National Particle Board Association Standard
28 NPA 5-82.
29 Wheat Straw Fiberboard:
30 Type: Agri-fiber based composite panels conforming to ANSI A208.1-1999, formulated without
31 formaldehyde.
32 Emissions: Total TVOC emission factors non-detectable after 48 hours measured according to ASTM D
33 5116-97.
34 Manufacturer: Dow "Woodstalk Gold MR" fiberboard or accepted substitute.
35 Thickness: 5/8 inch.
36 Minimum Density: 45 pcf minimum

37
38 PLYWOOD UNDERLAYMENT (ULMT)
39 Grade: APA B-C grade or better, group 1, with exterior grade phenolic glue, Exposure 1.
40 Thickness: 3/8, 19/32, and 1 1/8 inch where located on drawings.
41 Span Rating: Meets requirements of PS 1-95 Underlayment.
42 Sheet Size: 48 x 96 inch size unless otherwise indicated,
43 Surface Finish: Fully sanded with all plugs of solid hardwood veneer and sanded.
44 Edges: Square.

45
46 PRE-ENGINEERED UNDERLAYMENT (ULMT)
47 Provide a pre-engineered and manufactured underlayment that has been specifically designed with a
48 lifetime warranty for high performance and to meet installation requirements for all resilient flooring.
49 Manufacturer: Halex Corporation-USA, phone 800-576-1636, www.halexcorp.com.
50 Composition: Baltic Birch plywood, with exterior grade phenolic glue, Exposure 1.
51 Thickness: 6 mm, (approx. 1/4 inch) 5 plys.
52 Core: Solid plys with no voids.
53 Back: Solid filled and sanded back.
54 Sheet Size: Available in various sizes at contractor option.
55 Surface Finish: Fully sanded with all plugs of solid hardwood veneer and sanded.
56 Edges: Square.

57
58 SILL SEALER
59 Manufacturer: Protecto Wrap, Dow, Owens Corning, Knauf.

1 Material: Polyethylene foam or fiberglass at contractor option
2 Thickness: Manufacturer's standard.
3 Extent of Work: Install between wood plate and concrete/masonry foundation in width sized to match
4 wood plate.

5

6 **FASTENERS**

7 Bolts: Fed. Spec. FF-B-575.
8 Nuts: Fed. Spec. FF-N-836.
9 Expansion Shields: Fed. Spec. FF-S-325.
10 Lag Screws and Lag Bolts: Fed. Spec. FF-B-561.
11 Wood Screws: Fed. Spec. FF-S-111.
12 Nails and Staples: Fed. Spec. FF-N-105B.
13 Provide washers under bolt heads, lag heads, and nuts.
14 Provide all necessary for installation of work specified herein.
15 Hot-dip galvanize steel fasteners exposed to moisture.

16

17 **FRAMING CONNECTORS**

18 Zinc coated steel, code-approved, manufactured by Silver, Simpson, Timber Engineering Company, or
19 accepted substitute.
20 Selected manufacturer to be used throughout entire project.
21 If specific type is not shown on Drawings, use type recommended by manufacturer for conditions of
22 installation.
23 Connector model numbers shown on Drawings are taken from Simpson catalog.

24

25 **WOOD FURRING**

26 Square edge stock, thickness, size and spacing as required.

27

28 **WOOD BUCKS**

29 Nominal 2-inch stock, full width of wall or partition, unless otherwise indicated.
30 Let heads and sills 1/2 inch into jambs; spike securely.

31

32 **WOOD BLOCKING**

33 Provide 2 inch nominal framing lumber behind cabinets, roofing, sheetmetal, doors, windows, finish
34 hardware including door stops, toilet room accessories, mirrors, miscellaneous specialties, building
35 equipment, drapery track, and mechanical and electrical work. Verify exact location.

36

37 **WOOD CANT STRIPS**

38 Sizes shown, triangular shape, unless otherwise indicated.
39 Provide at built-up roofing perimeters, roof intersections with vertical surfaces, and elsewhere indicated.

40

41 **ROOF INSULATION STOPS**

42 Wood, thickness of insulation. Provide at insulated roof edges and around insulated roof openings.

43

44 **ATTACHMENTS FOR WOOD ENGAGING MASONRY OR CONCRETE**

45 Approved type metal plugs or inserts, spaced as directed.
46 Wood embedded in masonry or concrete not permitted unless shown on Drawings, then must be kiln
47 dried and pressure-preservative treated as specified in Section 06070.

48

49 **ADHESIVE**

50 Glue conforming with APA Spec. AFG-01.
51 Approved manufacturers: Evans, Franklin, Georgia-Pacific, Glidden-Durkee, 3M, Weldwood, Willhold,
52 Weyerhaeuser.

53

54 **PART 3 - EXECUTION**

55

56 **EXAMINATION**

57 Verify that surfaces to receive work specified herein are rigid, secure, accurately sized and located, and
58 otherwise properly prepared.

59 Prior to starting work notify General Contractor of surfaces requiring correction.

- 1 Do not start work until conditions are satisfactory.
2
- 3 **VERIFICATION OF CONDITIONS**
4 Where necessary verify field measurements prior to fabrication.
5 If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If
6 measurements differ substantially, notify Architect prior to fabrication.
7
- 8 **INSTALLATION - GENERAL**
9 Install proprietary products in accordance with manufacturer's directions.
10 Use additional fasteners to those specified herein where necessary to insure rigidity and permanence.
11 Provide washers under nuts and heads when making bolted or lag screwed connections.
12 Drive nails perpendicular to grain in lieu of toe-nailing, where feasible.
13 Machine nailing or stapling with written approval only.
14 Provide for installation and support of plumbing, heating, ventilating, and electrical work.
15 Accurately, located, cut, fit, and install work secure rigid, to true lines, plumb, and level, unless otherwise
16 indicated.
17
- 18 **FRAMING CONNECTORS**
19 Provide where indicated; secure with fasteners noted on drawings or as recommended by manufacturer if
20 none are noted.
21
- 22 **WALL PLATES**
23 Provide single plates at floors and bottoms of openings, double plates face-nailed together at ceilings and
24 tops of openings. Provide headers over openings.
25 Splice single plates. Stagger ends of double plates at least 4 ft. Splice plates abutting at corners. Locate
26 plate splices directly over studs.
27
- 28 **JOISTS AND BEAMS**
29 Set with crown side up; lap and spike together over bearings.
30 Minimum Bearing: 1 1/2 inches.
31 Boring and Notching: Comply with requirements of Section 01 73 29.
32
- 33 **PLYWOOD ROOF SHEATHING**
34 Install continuous over 2 or more supports, end joints on supports, and staggered, face grain
35 perpendicular to supports.
36 Space adjacent panels 1/16 inch minimum.
37 Fasten sheathing to framing as follows:
38 Nails: 10d common wire nails spaced 6 inches on center at panel edges and 12 inches on center
39 at intermediate supports.
40 Staples: Resin-coated steel wire, 13 gauge, 7/16 inch crown X 2 inches size at 6 inches on
41 center at panel edges and 12 inches on center at intermediate supports.
42
- 43 **PLYWOOD SUBFLOORS**
44 Install continuous over 2 or more supports, end joints on supports, and staggered, face grain
45 perpendicular to supports.
46 Space adjacent panels 1/16 inch minimum.
47 Glue as specified herein to all supports and to adjacent panel edges.
48 Fasteners:
49 Nails: 10d common nails spaced 6 inches on center along panel edges, and 10 inches on center
50 along intermediate supports.
51 Staples: Resin-coated steel wire, 12 gauge X 2 inch size spaced 6 inches on center along panel
52 edges, and 10 inches on center along intermediate supports.
53
- 54 **UNDERLAYMENT**
55 Except where cutting is necessary, lay in full-size sheets perpendicular to sub-floor, and immediately prior
56 to applying covering.
57 Stagger cross joints at least 16 inches, and space sheets maximum 1/16 inch.
58 Apply adhesive to underside of each panel around perimeter and strips at 16 inches on center.
59 Secure with 3d ring shank nails spaced 6 inches apart along panel edges and 8 inches apart along

- 1 intermediate supports.
- 2 Nail panel center first and then work out toward edges. Completely nail each panel before starting next.
- 3 Set nails 1/16 inch, but do not fill.
- 4 Remove overwood and rough spots by machine sanding; hand sand areas inaccessible to sander.

- 5
- 6 **PLYWOOD WALL SHEATHING**
- 7 Install continuous over 2 or more supports, end joints on supports.
- 8 Space adjacent panels 1/16 inch minimum.
- 9 Fasteners:
 - 10 Nails: 8d common wire nails spaced 6 inches on center at panel edges and 12 inches on center
 - 11 at intermediate supports.
 - 12 Staples: Resin-coated steel wire, 13 gauge X 1 3/4 inch size at 6 inches on center at panel
 - 13 edges and 12 inches on center at intermediate supports.

- 14
- 15 **WOOD FURRING**
- 16 Secure with fasteners spaced not more than 2 ft. apart.

- 17
- 18 **WOOD CANT STRIPS**
- 19 Securely attach to roof deck, straight, plumb, and true.
- 20 Where roof edges have deflected, provide shim strips to level position.

- 21
- 22 **AIR BARRIER INSTALLATION**
- 23 Install air barrier prior to installation of doors and windows.
- 24 Install according to manufacturer's instructions and details on Drawings.
- 25 Wrap sheet edge minimum 12 inches around wall corners.
- 26 Extend continuous from sill plate to top plate.
- 27 Minimize sheet laps. Where sheet laps are necessary, lap minimum 8 inches.
- 28 Staple to wall sheathing at minimum 30 inches on center.
- 29 Smooth out all wrinkles downward.
- 30 Cut door and window openings with X-cut across opening. Pull sheet to wrap rough opening and staple
- 31 to inside face of wall at opening jambs and sill. Lap sheet over window frame flange at opening heads.

- 32
- 33 **CLEANING AND REPAIRING**
- 34 Including work of other sections, clean, repair and touch-up or replace when directed, products which
- 35 have been soiled, discolored, or damaged by work of this section.
- 36 Leave surfaces ready for finishing specified in other sections.
- 37 Remove debris from project site upon work completion or sooner, if directed.

- 38
- 39 **PROTECTION**
- 40 Protect other work against damage or discoloration caused by work of this section.

- 41
- 42 **NAILING SCHEDULE**
- 43 Unless otherwise shown on drawings or in this specification, nailing shall be in accordance with the
- 44 Building Code.

- 45
- 46
- 47

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Thermal insulation organic or inorganic applied to walls, roofs, perimeter of foundations, and other heated
5 spaces.

6
7 **DELIVERY, STORAGE, AND HANDLING**

8 Deliver to project site in manufacturer's original unopened packages.
9 Label package wrappers with brand name, insulation type, and thermal rating.
10 Store materials off ground.
11 Protect against moisture and damage.
12 Do not use damaged or damp insulation.

13
14 **ENVIRONMENTAL REQUIREMENTS**

15 Do not install insulation when surfaces to receive insulation are wet.

16
17 **COORDINATION**

18 Coordinate with other trades affecting or affected by work of this section.

19
20 **PART 2 - PRODUCTS**

21
22 **FLEXIBLE BATTS**

23 **Manufacturer:**

24 Manufactured by Johns-Manville, US Gypsum, Owens-Corning, Certain-teed, or accepted substitute.

25 **Material:**

26 Glass wool or mineral wool blankets, full-length, single-piece where practicable, conforming to Fed.
27 Spec.HH-I-521 and with insulating R-value as shown on Drawings.

28 **Facings:**

29 Manufacturers standard kraft paper or foil vapor retarder facing conforming to Fed. Spec. HH-I-521E, type
30 II; FS 25 facing where exposed in attic.
31 Maximum Permeability Rating: 1.0 perms.

32 **Extent of Work:**

33 Provide blanket insulation at exterior of all heated spaces in thickness and locations as shown on
34 Drawings.

35
36 **WIRE**

37 Noncorrosive steel, 18 ga. minimum.

38
39 **ADHESIVE**

40 Manufactured or recommended by insulation manufacturer.

41
42 **MECHANICAL FASTENERS**

43 Type recommended by insulation manufacturer.
44 Long enough to penetrate substrate 1/2 inch, minimum.

45
46 **PART 3 - EXECUTION**

47
48 **EXAMINATION**

49 Verify that work of preceding trades is completed.
50 Verify that surfaces and spaces to receive insulation are accurately sized, located, dry, protected against
51 inclement weather, clean, and otherwise properly prepared.
52 Prior to starting work notify General Contractor of defects requiring correction.
53 Do not start work until conditions are satisfactory.

54
55 **PREPARATION**

56 Remove, or protect against projections which may damage insulation or prevent proper installation.
57 Remove bond-reducing coatings, and roughen surfaces, to receive insulation by adhesion as necessary
58 for bond.
59 Prime surfaces to receive insulation by adhesion.

- 1 INSULATION INSTALLATION - GENERAL
- 2 Follow manufacturer's directions.
- 3 Fit insulation snugly between framing without forcing.
- 4 Permit no gaps for air passage.
- 5 Carefully cut and fit insulation around pipes, conduits, and other obstructions.
- 6 Where pipes, conduit, and other obstructions are located in space to receive insulation, place insulation
- 7 between cold-in-winter surface and obstruction, compressing insulation where necessary.
- 8 Unless indicated otherwise, do not compress insulation more than 10%.
- 9
- 10 INSTALLATION - FLEXIBLE BATTS
- 11 Install insulation with vapor retarder facing to the warm-in-winter side of assembly.
- 12 Use full-length, single-piece batts where practicable.
- 13 Staple facing flanges to wood framing sides, 8 inches on center maximum.
- 14 Provide additional wire support as necessary to prevent insulation displacement or sagging.
- 15
- 16 INSPECTION
- 17 Notify Architect at least 24 hours prior to completing insulation work for inspection.
- 18
- 19 CLEANING AND REPAIRING
- 20 Including work of other sections, clean, repair and touch-up, or replace when directed, products which
- 21 have been soiled, discolored, or damaged by work of this section.
- 22 Remove debris from project site upon work completion or sooner, if directed.
- 23
- 24 PROTECTION
- 25 Maintain the following minimum clearances between insulation and recessing lighting fixtures, metal
- 26 chimneys, metal gas vents and similar high temperature equipment unless equipment is U.L. labeled for
- 27 zero-clearance:
- 28 Side: 3 inches.
- 29 Top: 24 inches.
- 30 Protect other work against damage and discoloration caused by work of this section.
- 31
- 32
- 33

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Elastic sheet vapor retarders for all exterior thermal insulation and air barrier installed as part of the
5 exterior envelope construction.

6
7 **SUBMITTALS**

8 Submit in accordance with Section 01 33 00.
9 Product Data:
10 Manufacturer's data and details to include installation instructions.

11
12 **QUALITY ASSURANCE**

13 Subcontract the vapor retarder work of this section to the installer of associated work so there will be
14 undivided responsibility for the related items of work.

15
16 **PROJECT CONDITIONS**

17 Proceed with vapor retarder work only after substrate work has been completed.
18 The contractor shall examine the substrate and the conditions under which the vapor retarder work is to
19 be performed. Do not proceed with the work until satisfactory conditions have been corrected.

20 Environmental Requirements:

21 Proceed with weather barrier work only when weather conditions will permit the materials to be applied in
22 accordance with manufacturer's recommendations.

23
24 **COORDINATION**

25 Coordinate with other trades affecting or affected by work of this section.

26
27 **PART 2 - PRODUCTS**

28
29 **VAPOR RETARDERS**

30 Sheet Barrier Above Grade:

31 Translucent polyethylene film, 6 mil thickness, maximum permance = 1.0.

32 Provide at all interior warm side wall locations.

33 Option: Sheet barrier above grade may be part of batt insulation material that contains a factory
34 applied treated composition kraft paper or foil membrane on one side. Refer to Section 07 21 00
35 for product options.

36
37 **WEATHER-RESISTIVE BARRIER (WRB)**

38 Material: Spun-bonded polyolefin, non-woven, non-perforated air infiltration and moisture barrier.

39 Fire Characteristics: Flame Spread Class A, tested in accordance with ASTM E 84.

40 Manufacturer and Model: DuPont "Tyvek DrainWrap", or accepted substitute.

41 Flexible Flashing: Adhesive-backed flexible membrane; DuPont "Flex-Wrap NF". Provide at window sills
42 and other opening sills as detailed on Drawings.

43 Straight Flashing: DuPont StraightFlash" straight flashing membrane materials for flashing windows and
44 doors and sealing penetrations and masonry ties, etc.

45 Sealant: Elastomeric polymer sealant; DuPont Commercial Sealant, or accepted substitute.

46 Seam Tape: 3 inch wide DuPont Tyvek tape.

47 Adhesive: Recommended by WRB manufacturer.

48 Fasteners:

49 Steel Framing: DuPont Tyvek Wrap Cap Screws with 1-5/8 inch rust resistant screw with 2-inch
50 diameter plastic cap or manufacturer approved 1-1/4" or 2" metal gasketed washer.

51 Wood Framing: DuPont Tyvek Wrap Caps with #4 nails with 1-inch plastic cap fasteners.

52
53 **ACCESSORIES**

54 Vapor Retarder Tape:

55 Stego Wrap Red Polyethylene Tape or accepted substitute.

56 Adhesive-backed, mylar-faced aluminum foil, 1-1/2 inches wide, 0.00 perm rating; Alumiseal Zero Perm;

57 adhesive-backed, polyethylene by Monsanto Plastics & Resins Co.; adhesive-backed, Polypropylene
58 sheathing tape No. 8086 by 3M Contractor Products, or accepted substitute.

59 Sealant:

1 Elastic, polyurethane base, flexible sealant used to seal vapor retarder materials together or to other
2 substrates as recommended by vapor retarder manufacturer.

3

4 **PART 3 - EXECUTION**

5

6 **EXAMINATION**

7 Verify that surfaces to receive work specified herein are rigid, secure, accurately sized and located, and
8 otherwise properly prepared.

9 Prior to starting work notify General Contractor of surfaces requiring correction.

10 Do not start work until conditions are satisfactory.

11

12 **PREPARATION**

13 Clean substrate of projections and substances detrimental to the work; comply with recommendations of
14 the vapor retarder manufacturer.

15 Remove ice, snow, grease, dust or other foreign material that may prevent bonding to substrate.

16 Install cant strips, flashings and similar accessory items as shown, and as recommended by vapor
17 retarder manufacturer. Prime substrate where recommended by the manufacturer.

18

19 **INSTALLATION - VAPOR RETARDERS**

20 Exterior Walls:

21 Locate over exterior wall insulation continuously from floor to underside of roof/attic insulation on the
22 warm-in-winter side of wall.

23 Sequence of insulation and vapor retarder installation: Protect insulation at all times against migration of
24 moisture vapor.

25 Immediately protect insulation with vapor retarder after insulation installation.

26 Apply sheets full height in one piece. Lap edges minimum 6"; seal with specified sealant or vapor
27 retarder tape. Make all laps over framing members.

28 Staple to framing members using compression type gun.

29 To avoid water vapor migration prior to installation of finish wall material, seal all edges and joints with
30 specified sealant.

31 Carefully cut retarder around framing members, conduits, and other penetrations; seal edges by lapping a
32 separate piece of vapor retarder material.

33 Option: If batt insulation with factory applied membrane is used, do not install polyethylene film
34 referenced in Part 2 above, instead refer to Section 07 21 00, Part 3, for installation.

35

36 **INSTALLATION – WEATHER-RESISTIVE BARRIER (WRB)**

37 Install weather-resistive barrier with grooves oriented vertically according to manufacturer's directions and
38 details shown on Drawings.

39 Install WRB prior to installation of doors and windows.

40 Wrap sheet edge minimum 12 inches around wall corners.

41 Extend continuous from sill plate to top plate. Install WRB in a horizontal manner starting at the lower
42 portion of the wall surface. Maintain weather barrier plumb and level.

43 Minimize sheet laps. Where sheet laps are necessary, lap minimum 8 inches. Overlap lower layers a
44 minimum of 6 inches horizontally in a shingling manner.

45 Fasten to wall framing as recommended by WRB manufacturer through exterior sheathing. Secure using
46 weather barrier manufacturer recommended fasteners, space 12 -18 inches vertically on center along
47 stud line, and 24 inch on center, maximum horizontally.

48 Smooth out all wrinkles downward.

49 Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams. Seal any
50 tears or cuts as recommended by WRB manufacturer.

51 Install opening perimeter flashing materials according to manufacturer's recommendations and details
52 shown on Drawings.

53

54 **PROTECTION**

55 Protect other work against damage and discoloration caused by work of this section.

56

57

58

59

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Preformed metal roofing and siding system, and accessories.

5
6 **REFERENCES**

7 General Requirements for Aluminum-Zinc Coated Sheet: ASTM A 792.

8
9 **PERFORMANCE REQUIREMENTS**

10 Weathertightness:

11 Fasteners: Do not penetrate roofing panels except at attachment of certain flashings and in some vertical
12 applications as detailed on the drawings.

13 Sheet Edges: Manufacturer's standard configurations which, when jointed together with adjacent panels
14 without sealant, will produce a leak-proof joint under conditions exposed to dynamic rain and wind
15 velocity of 70 mph for five minutes, as tested in accordance with the principals of NAAM, TM-1.

16 Design Loads:

17 Design entire roof system, including fasteners to withstand the following loads:

18 Positive Uniform Live Load: 25 pounds per square foot.

19 Negative Uniform Load at eaves and ridge: 15 pounds per square foot.

20 Negative Uniform Load Elsewhere: 10 pounds per square foot.

21 Conform to NFPA Design Specifications for allowable withdrawal load for sheetmetal screws into
22 plywood.

23 Thermal Movement:

24 Design roof panel and flashing attachments to accommodate thermal expansion and contraction of
25 exterior material through a -10 degrees F to a +200 degrees temperature change for the panel
26 temperatures.

27
28 **SUBMITTALS**

29 Provide in accordance with Section 01 33 00.

30 Manufacturer's Data:

31 Submit copies of specifications, installation instructions, and standard detail drawings for preformed
32 roofing panels. Include current manufacturer's product literature and design guide substantiating that
33 materials and finishes comply with specifications.

34 Samples:

35 Submit full range of manufacturer's standard colors for color selection.

36 After color selection, submit (2) 12 inch long by full width samples for verification of pattern, texture and
37 color.

38 Shop Drawings:

39 Submit shop drawings showing details of forming, jointing, gaskets, supports, anchorages, trim, flashing,
40 and accessories. Show details of weatherproofing at edges, terminations and penetrations of the roofing
41 work. Show manufacturer's approved layout of entire work.

42
43 **QUALITY ASSURANCE**

44 Manufacturer's Experience: Minimum 10 years in architectural roofing manufacturing, and minimum 10
45 years use for specified panels. Provide examples of past experience on similar projects, materials, and
46 exposure.

47 Installer's Experience: Authorized by panel manufacturer. Installation supervisor trained by panel
48 manufacturer in proper installation of specified products.

49
50 **DELIVERY, STORAGE AND HANDLING**

51 Keep roofing products dry prior to installation.

52 Avoid condensation by storing all sheets in a dry location.

53 Do not allow sheets to come in contact with materials which might cause staining. Provide
54 manufacturer's approved spreader to adequately support long length panels during all handling
55 operations. Refer to manufacturer's literature for support requirements.

56 Protect all roofing system components from damage while in transit.

57
58 **COORDINATION**

59 Coordinate with other trades affecting or affected by work of this section.

1 **WARRANTY**

2 Panels:

3 Prior to completion of the project submit panel manufacturers 20 year warranty against structural defects
4 or corrosion.

5 Finish:

6 Provide panel manufacturers 20 year warranty on the Kynar Fluorocarbon for durability and color fade.

7 Installer:

8 Provide subcontractor/installers 1 year guarantee on workmanship and leaks.

9
10 **MAINTENANCE WARRANTY**

11 Prior to final project acceptance submit in accordance with Section 01 78 23, 2 copies of the following
12 Maintenance Warranty for inclusion in Owner's Maintenance Manual:

13 We, the undersigned, do hereby warrant all sheetmetal roofing, and sheet metal flashing against failure
14 due to defective materials and/or workmanship to remain watertight for two (2) years after final
15 acceptance with normal usage, and to repair without additional cost to Owner any such leaks and
16 resulting damage as may occur.

17
18 **CONTRACTOR:** _____

19
20 **BY:** _____

21
22 **MAINTENANCE**

23 Provide Owner with 1 gallon of touch-up paint matching roofing panel color, 40 square feet of prefinished
24 coil stock as used for flashings, and 50 color capped screws.

25
26 **PART 2 - PRODUCTS**

27
28 **ROOFING**

29 Material:

30 Metal: Prefinished steel conforming to ASTM A 446, Grade C, minimum yield strength 40,000 psi, 0.024
31 inch thickness minimum thickness.

32 Protective Coating: Zinalume or Galvalume, conforming to ASTM A 792-83, 45% zinc and 55%
33 aluminum by weight, applied to a thickness of 1.9 mils.

34 Finish: Polyvinylidene Fluoride (PVF2). Kynar-500 70% resin finish coat applied over a 0.2 mil. baked-on
35 epoxy base primer to a total film thickness of 1.0 mil.

36 Type:

37 Flat pan standing seam without intermediate stiffening ribs, with concealed fasteners and locking seam
38 cap. Standing seam minimum 1" height, maximum 1 1/2" height.

39 Panel Width:

40 Manufacturer's standard width, 12" minimum, 18" maximum. All panels of uniform width.

41 Color:

42 As selected by Architect from manufacturer's standard color line.

43 Manufacturer:

44 AEP Span "Design Span hp", Taylor Metal Products "Versa Span", or accepted substitute.

45
46 **SIDING**

47 Material:

48 Metal: Prefinished steel conforming to ASTM A 446, Grade C, minimum yield strength 40,000 psi, 0.024
49 inch thickness minimum thickness.

50 Protective Coating: Zinalume or Galvalume, conforming to ASTM A 792-83, 45% zinc and 55%
51 aluminum by weight, applied to a thickness of 1.9 mils.

52 Finish: Polyvinylidene Fluoride (PVF2). Kynar-500 70% resin finish coat applied over a 0.2 mil. baked-on
53 epoxy base primer to a total film thickness of 1.0 mil.

54 Type:

55 Flat pan standing seam without intermediate stiffening ribs, with concealed fasteners and locking seam
56 cap. Standing seam minimum 1" height, maximum 1 1/2" height.

57 Panel Width:

58 Manufacturer's standard width, 12" minimum, 18" maximum. All panels of uniform width.

59 Color:

1 As selected by Architect from manufacturer's standard color line.
2 Manufacturer:
3 AEP Span "Design Span hp", Taylor Metal Products "Versa Span", or accepted substitute.
4
5 **METAL SOFFITS**
6 Material: Prefinished steel conforming to ASTM A 446, Grade C, minimum yield strength 40,000 psi,
7 0.024 inch thickness.
8 Type: Linear flat panel in 12 inch wide modules, without intermediate stiffening ribs or flutes; AEP Span
9 "Flush Panel", Taylor Metal Products "Lifetime Soffit", or accepted substitute.
10 Finish: Same finish as roofing panels.
11 Color: As selected by Architect from manufacturer's standard color line.

12
13 **GUTTERS AND DOWNSPOUTS**
14 Fabricate as illustrated on the drawings from material matching the metal siding panel alloy, finish and
15 color.

16
17 **FLASHINGS**
18 Material: Same type and finish as the roof or siding panel, but may be tempered differently to facilitate
19 forming.
20 Minimum thickness: Same as roof or siding panel.
21 Finish: Polyvinylidene Fluoride (PVF2). Kynar-500 70% resin finish coat applied over a 0.2 mil. baked-on
22 epoxy base primer to a total film thickness of 1.0 mil.

23
24 **ACCESSORIES**
25 Install in accordance with manufacturer's printed instructions.
26 Anchor Clip: Stainless steel heavy base for attachment of panels for concealed installation. Allow
27 thermal movement of panels. Spacing and location as required for loading conditions.
28 Gable Clip: For attachment of end panels of each roofing or wall area. Provide attachment of flashing
29 independent of roof panel movement.
30 Ridge Closure: Manufacturer's standard channel closure with foam insert conforming to profile of panels.
31 Color and finish to match roofing.
32 Exposed Fastener with Color Cap: Stainless steel fastener with plastic cap to match roof panel color.
33 Exposed screw fastener to include washers with hot bonded neoprene faces.
34 Concealed Fastener: Size and pattern as approved by manufacturer.
35 Sealant Tape: Approximate 1/8" x 1" profile as recommended by manufacturer.
36 Foam Tape: Closed-cell foam rubber with adhesive, and of various profiles per manufacturer's
37 recommendations at each detail.
38 Sealant Bed: Apply per manufacturer's installation instructions to entire contact where flashings overlap.
39 Surface Sealant: Curing type, color selected by Architect. Apply continuous bead at edge of lap joints
40 cut edges of folded joints.
41 Products and materials listed above provided by roofing manufacturer.

42
43 **PART 3 - EXECUTION**

44
45 **EXAMINATION**
46 Examine substrate and conditions under which metal roofing and accessories work is to be performed.
47 Do not proceed with installation of any work specified herein until all supporting surfaces are complete,
48 clean, true and prepared per manufacturer's instructions for application of materials.

49
50 **PREPARATION**
51 Verify count and alignment of panels to meet layout requirements. Repair any breaks or interruptions of
52 isolating material before commencing panel installation.
53 Do not install panels or related materials in rain, snow, or wind conditions that would result in damage to
54 panels or entrapment of water between the sheathing and the panels, or accessories.

55
56 **INSTALLATION**
57 Roof Panels, Siding Panels, and Metal Soffits:
58 Remove any strippable protective coatings on the metal panels after installation. Coatings may be
59 partially removed to facilitate installation.

- 1 Where panels are in contact with wood or other absorptive materials subject to wetting, or treated with
- 2 preservative, provide underlayment or manufacturer's approved elastomeric sheet adhesive or
- 3 mechanically attached.
- 4 Apply roofing anchor clips to the structure at each panel joint (12" on center) at longitudinal spacing not
- 5 greater than that recommended by manufacturer to allow for positive and negative uniform loads as
- 6 specified above.
- 7 No perforations permitted in panels by fasteners except flashing, closures, or trim as shown on details.
- 8 Install penetrations for plumbing, ventilators and any other equipment or structures that are supported by
- 9 the panels in accordance with manufacturer's direction. Allow for thermal movement of panels.
- 10 Engage anchor clip as recommended by manufacturer before positioning hook rib of adjacent panel.
- 11 Use manufacturer's pan end tool to turn up the upper end of all panels to be square cut.
- 12 Provide channel closure as recommended by the manufacturer, at all panels cut at an angle.
- 13 Flashings:
- 14 Install linear flashings with approved slip joints between sections. Use three part joint with backing plate
- 15 behind gap and anchor clip to hold joint tight. Provide approved sealant between pieces. Do not use lap
- 16 joints without prior approval of architect.
- 17 Gutters and Downspouts:
- 18 Form gutters and downspouts to configurations shown on drawings.
- 19 Fabricate downspouts in continuous lengths from gutter to termination spout.
- 20 At roof edges, extend gutter lining under roof panels 4 inches minimum.
- 21 Seal all joints watertight.
- 22 Do not attach gutters to roof panels in any manner.
- 23 Slope gutters 1/16 inch per foot.

24
25 **CLEANING**

- 26 As panels are installed, sweep clean and apply touch-up paint where required. Do not allow debris to
- 27 accumulate on panels.
- 28 Apply touch-up paint to flashings and accessories.
- 29 Clean away excess sealants.

30
31 **PROTECTION**

- 32 Protect other work against damage and discoloration caused by work of this section.

33
34
35

END OF SECTION

1 **PART 1 - GENERAL**

2

3 **SECTION INCLUDES**

4 Shop or field formed sheet metal products with waterproof joints; accessories and trim such as gutters,
5 downspouts, copings, and metal or flexible flashings for roof or wall construction.

6

7 **SUBMITTALS**

8 Provide in accordance with Section 01 33 00.

9 Samples:

10 Submit two samples of pre-finished sheet metal in each color selected.

11 Shop Drawings:

12 Submit shop drawings showing profiles, dimensions, location and arrangement of joints, supports, types
13 and locations of fasteners and other anchorage, sealant and accessories. Show details of
14 weatherproofing at edges, terminations and penetrations.

15

16 **REFERENCES**

17 Architectural Sheet Metal Manual, published by the Sheet Metal and Air Conditioning Contractors'
18 National Association (SMACNA), current edition.

19

20 **DELIVERY, STORAGE, AND HANDLING**

21 Protect against damage and discoloration.

22 Store off ground.

23

24 **WARRANTY**

25 Warrant work weathertight for 3 years, subject to General Condition terms.

26

27 **COORDINATION**

28 Coordinate with other trades affecting or affected by work of this section.

29

30 **PART 2 - PRODUCTS**

31

32 **SHEET METAL**

33 Pre-finished Sheet Steel:

34 Material: Sheet steel, 24 gauge thickness, unless otherwise shown on Drawings.

35 Exterior Finish: Baked on corrosion resistant primer and baked on Polyvinylidene Fluoride (PVDF) finish
36 coat which includes 70% Kynar 500/Hylar 5000 resins.

37 Color: Selected by Architect.

38 Location: Where exposed and elsewhere shown on Drawings.

39

40 **SCREWS**

41 Pan head, self-tapping, sheet metal type; conforming to Fed. Spec. FF-S-107; #7 by one inch long
42 minimum, cadmium plated, use stainless steel at stainless steel metal.

43

44 **RIVETS**

45 1/8 inch minimum diameter, length as recommended by rivet manufacturer for materials to be joined;
46 cadmium plated.

47

48 **EXPANSION ANCHORS**

49 Type recommended by manufacturer for conditions of use.

50 1/4 inch diameter by 1 inch long, minimum.

51

52 **SOLDER**

53 ASTM B 32; 50% Tin and 50% Lead.

54

55 **FLUX**

56 Rosin, cut muriatic acid, or commercial preparation for material to be soldered.

57

58 **SEALANT**

59 Silicone type conforming to Fed. Spec. TT-S-001543; Dow, GE, or accepted substitute.

1 ASPHALT PLASTIC CEMENT
2 Fed. Spec. SS-C-153, Type 1.
3
4 PRIMER COATING AND UNDERCOATINGS
5 Galvanized iron primer as specified in Section 09 90 00.
6

7 ASPHALTIC COATING COMPOUND
8 Fed. Spec. TT-C-494, Type 11.
9

10 **FABRICATION**

11 General:
12 Form to details shown on Drawings or described herein. For work not described or detailed in the
13 Drawings or Specifications, refer to SMACNA "Architectural Sheet Metal Manual".
14 Form to shapes and dimensions shown with planes and lines in true alignment.
15 Unless otherwise shown on Drawings or specified fabricate with longest practicable lengths.
16 Hem exposed edges.
17 Angle bottom edge of vertical surfaces to form drip.

18 Cleats:
19 Same material and thickness as sheet metal.
20

21 **PART 3 - EXECUTION**

22
23 **EXAMINATION**

24 Verify that surfaces to receive sheet metal are smooth, clean, and otherwise properly prepared.
25 Verify that reglets and nailers to receive sheet metal are properly placed.
26 Prior to starting work notify General Contractor of defects that require correction.
27 Do not start work until conditions are satisfactory.
28

29 **PREPARATION**

30 Before fabricating sheet metal, verify shapes and dimensions of surfaces to be covered.
31 If field measurements differ slightly from Drawing dimensions modify work as required for accurate fit. If
32 measurements differ substantially notify Architect prior to fabrication.
33

34 **INSTALLATION, GENERAL**

35 Install work watertight, without waves, warps, buckles, tool marks, fastening stresses, distortion, or
36 defects which impair strength or mar appearance.
37 Install planes and lines to true alignment.
38 Allow for sheet metal expansion and contraction.
39

40 **SEAM INSTALLATION**

41 Common Lock Seams:

42 3/4 inch finish width; 4-ply loose-locked.

43 Flat Lock Seams:

44 5/8 inch finish width; 4-ply flat-locked, malleted tight; sweat full with solder.

45 Drive Lock Seams:

46 Fold back abutting edges and cover joint with 1 1/8 inch wide loose drive cap.

47 Single Corner Seams:

48 3/4 inch finish width, 3-ply loose locked.

49 Double Corner Seams:

50 5/8 inch finish width; 4-ply loose locked.

51 Lap Seams:

52 3 inch finish width.

53 Solder-Lap Seams:

54 1 inch finish width; sweat full with solder.

55 Cover Plate Seams:

56 Space abutting sheets 1/2 inch; cover joint with 4 inch wide cover and back-up plates set in sealant.

57 Match plates to flashing profile.

58 Secure plates to substrate with screw installed through open space between flashing sheets.

59 S-Lock Seams:

- 1 Form 1 1/4 inch wide "S" shaped seam on one edge of flashing sheet for concealed fastening.
2
- 3 **CLEAT INSTALLATION**
4 Space 2 feet on center, unless continuous cleats or other spacings are specified hereunder.
5 Secure spaced cleats to substrate with 2 fasteners.
6 Secure continuous cleats to substrate with fasteners spaced at 12 inch maximum centers.
7 Cover fastener heads with cleat tabs.
8
- 9 **SOLDERING**
10 Clean and flux metals prior to soldering.
11 Sweat solder completely through seam widths.
12
- 13 **SEALANT INSTALLATION**
14 Apply 1/4 inch diameter bead, centered in full length of joint.
15
- 16 **ASPHALT PLASTIC CEMENT INSTALLATION**
17 Trowel apply 1/8 inch thick.
18
- 19 **COUNTER FLASHINGS**
20 Form of 26 gage galvanized steel.
21 Overlap base flashing 4 inches minimum.
22 Install bottom edge spring-tight against base flashing, or at Contractor's option secure bottom edge with 1
23 inch wide clips spaced no greater than 24 inch on center. Attach clips to substrate with concealed
24 fasteners. Reinforce clips by double-bending back over bottom edge of counter flashing 3/4 inch.
25 Lap-seam vertical joints, and apply sealant.
26 Miter, lap-seam, and close corner joints with solder.
27 Provide where roof intersects vertical surfaces and elsewhere shown on Drawings.
28
- 29 **APRON FLASHING WHERE ROOF SLOPES AWAY FROM VERTICAL SURFACE**
30 Form of 26 gage galvanized steel.
31 Extend up vertical surface 4 inches minimum and onto roof surfaces 4 inches minimum.
32 Secure top edge to substrate.
33 Hem bottom edge 1/2 inch.
34 Lap-seam vertical joints 3 inches minimum and apply sealant. Engage hemmed edges.
35 Miter and extend around corner 3 inches minimum and solder joints.
36 Install bottom edge spring-tight against roofing, or at Contractor's option secure with 1 inch wide clips
37 spaced at 24 inch maximum centers; attach clips to substrate with concealed fasteners. Reinforce clips
38 by double-bending back over apron flashing 3/4 inch.
39
- 40 **CUSTOM FORMED METAL**
41 At Windows, Doors, Louvers and Other Openings: Form to detail of prefinished steel. Color and finish to
42 match adjacent frames.
43
- 44 **GUTTERS**
45 Form to detail of 24 gage prefinished steel.
46 Lap joints 1 inch minimum, rivet at 2 inch centers and solder.
47 Provide gutter end caps.
48 Provide expansion joints midway between downspouts; overlap gutter sections 2 1/2 inches and provide
49 end caps spaced 1/2 inch apart.
50 Close expansion joint tops with loose-lock cover; extend cover over outer edge of gutter, and embed in
51 sealant.
52 Extend inner end of cover under roof edge flashing.
53 Secure end caps with 1 inch minimum width flanges riveted and sealed to gutter.
54 Locate and shape outlet thimble to fit each downspout.
55 Size thimble 1/8 inch less than downspout, and extend 2 inches below gutter soffit.
56 Rivet and seal thimble flanges to gutter bottom.
57
- 58 **DOWNSPOUTS**
59 Form of 24 gage pre-finished steel.

- 1 Fabricate longitudinal joints with double corner seams.
- 2 Telescope upper into lower sections 1 1/2 inches minimum, rivet and seal.
- 3 At open downspout ends provide elbow bends away from building.
- 4 Attach to wall with 1 1/4 inch wide straps matching downspout material, and 1 gauge heavier.
- 5 Locate straps at downspout tops, bottoms, horizontal joints, and at 10 ft. maximum centers.
- 6 Secure straps as required.
- 7 Except where otherwise shown on Drawings, install downspouts plumb; modify straps if necessary.
- 8 Extend downspouts 3 inches minimum into storm drain hub.

9
10 **ROOF PENETRATIONS (if any)**

11 General:

12 Form of 26 gage galvanized steel.

13 Base Flashing:

14 Extend flange onto roof 8 inches minimum in all directions away from penetration, and upward around
15 penetration to position at least 2 inches above roof flood line.

16 At sheet metal roofing fold upper and side edges back flange 1/2 inch.

17 Solder-lap joints.

18 Furnish to roofer for installation.

19 Counter Flashing:

20 Overlap base flashing at least 1 inch with storm collar sloped away from penetration.

21 Secure to penetration with solder.

22
23 **MISCELLANEOUS FLASHING**

24 Provide flashing around doors, windows, louvers, and other openings in exterior walls where indicated or
25 required to maintain building watertight.

26
27 **CLEANING AND REPAIRING**

28 As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse.

29 Including work of other sections, clean, repair and touch-up, or replace when directed products which
30 have been soiled, discolored, or damaged by work of this section.

31 Leave surfaces ready for finish painting specified in Section 09 90 00.

32 Remove debris from project site upon work completion or sooner, if directed.

33
34 **PROTECTION**

35 Protect other work against damage and discoloration caused by work of this section.

- 36
- 37
- 38

END OF SECTION

PART 1 - GENERAL

SECTION INCLUDES

Elastomeric and non-elastomeric sealants, caulking compounds, compression seals, joint fillers and related accessories.

DELIVERY, STORAGE, AND HANDLING

Protect against damage.
Store products in original, tightly sealed containers, original labels thereon.
Do not exceed sealant shelf life.

SUBMITTALS

Submit in accordance with Section 01 33 00.

Manufacturer's Data:

Provide Manufacturer's installation instructions for each product used.
Provide Manufacturer's Literature and Data for primers and each type of sealant including compatibility when different sealants in contact with each other.

Samples:

Provide cured samples of exposed sealants for each color where required to match adjacent material.

ENVIRONMENTAL REQUIREMENTS

Perform no work when weather exceeds manufacturer's specified limits.

EMISSIONS STANDARDS

Conform to the following minimum standards for sealant emissions:

Sealant Type	VOC Limits	Standard
Architectural Sealants:	250 g/L	SCAQMD Rule #1168
Other Sealants:	420 g/L	SCAQMD Rule #1168

QUALITY ASSURANCE

Installer Qualifications:

Experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

Source Limitations:

Obtain each type of joint sealant through one source from a single manufacturer.

Sealant Testing:

Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.

Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.

Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:

Locate test joints as directed by Architect.

Conduct field tests for each application indicated below:

Each type of elastomeric sealant and joint substrate indicated.

Each type of non-elastomeric sealant and joint substrate indicated.

Notify Architect seven days in advance of dates and times when test joints will be installed

Mockups:

Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:

Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this section.

Pre-Application Meeting:

Prior to sealant application, arrange meeting to clarify any questions about Specifications, details, and

- 1 application requirements.
- 2 Representatives of the following shall attend:
- 3 Owner
- 4 Architect
- 5 General Contractor
- 6 Sealant Contractor with Supervisor
- 7 Sealant Manufacturer Representative
- 8

9 **WARRANTY**
10 Caulking and sealing subject to 2 year weatherproof warranty called for in Supplementary Conditions,
11 Section 00 73 00.

12
13 **COORDINATION**
14 Coordinate with other trades affecting or affected by work of this section.

15
16 **PART 2 - PRODUCTS**

17
18 **SILICONE SEALANT**
19 GE, Dow, Bostik 1250, or approved substitute, with mildew inhibitor, conforming to Fed. Spec. TT-S-
20 001543.
21 Select proper type in accordance with manufacturer's recommendations.

22
23 **URETHANE SEALANT**
24 Vertical Joints:
25 Non-sag, one component type; Pecora "Dynatrol I", Sonneborn "Sonolastic NP 1", Bostik Chem-Caulk
26 915, or approved substitute.

27 Horizontal Joints:
28 Self-leveling, one component type; Pecora "Urexpan NR-201", Sonneborn "Sonolastic SL 1", Bostik
29 Chem-Cail 955-SL, or approved substitute.

30
31 **FOAM AIR-INFILTRATION SEALANT**
32 Grace Polycel One, or approved substitute.

33
34 **FOAM PENETRATION SEALANT**
35 UL classified Fire-rated Penetration Seal; Dow Corning Fire Stop Foam, GE Pensil 851, 3M Sealing
36 System 7904, or approved substitute.

37
38 **SEALANT COLORS**
39 Urethane Sealant: Approximate color of adjacent surfaces, unless otherwise directed.
40 Silicone Sealant: Approximate color of adjacent surfaces, or clear if color not available.
41 Foam Sealant: Contractor's choice.

42
43 **PRIMER AND SURFACE CONDITIONER**
44 Made or recommended by manufacturer of compound or sealant.

45
46 **BACKER ROD**
47 Closed-cell polyethylene gasketing rod, Dow "Ethaform," or approved substitute.
48 Diameter: 1/4 greater than width of joint where to be installed.

49
50 **PART 3 - EXECUTION**

51
52 **EXAMINATION**
53 Inspect joints to be sealed and verify that joints are clean, dry, and free from dust, oil, grease, rust,
54 lacquer, laitance, loose mortar, or other bond-reducing matter.
55 Allow concrete surfaces to dry at least 4 weeks before sealing.
56 Prior to starting work notify General Contractor of defects requiring correction.
57 Do not start work until conditions are satisfactory.

58
59 **PREPARATION**

- 1 General:
- 2 Remove dust, dirt and other foreign matter from joints to be sealed by brushing and air-blowing.
- 3 Priming:
- 4 Prime unpainted surfaces to receive sealant.
- 5 Apply with bristle brush. Do not flood surfaces.
- 6
- 7 **BACKER INSTALLATION**
- 8 Install backer rod behind sealant in accordance with manufacturer's directions.
- 9 Provide in as long continuous lengths as practicable.
- 10 Stretch taut and force into joints to uniform depth, approximately 1/2 Joint width but not to exceed 1/2
- 11 inch.
- 12 Replace any punctured backer rod.
- 13
- 14 **FOAM SEALANT INSTALLATION**
- 15 Follow sealant manufacturer's directions.
- 16 Inject sealant continuously until opening is filled.
- 17 If opening is not filled within sealant snap time or maximum of 3 minutes, stop application for at least 15
- 18 minutes before resuming work.
- 19 Trim cured foam flush with adjacent surface.
- 20
- 21 **OTHER SEALANT INSTALLATION**
- 22 Apply sealant in accordance with manufacturer's directions using gun-type dispenser.
- 23 Size gun nozzle to fit joint.
- 24 Seal joints before applying final paint coat.
- 25 Fill joints and voids solid; superficial pointing with skin bead not acceptable.
- 26 Install flush with adjacent surfaces.
- 27 Tool joints smooth within 10 minutes after installation.
- 28 Remove masking materials, if any, immediately after sealant installation.
- 29
- 30 **APPLICATION**
- 31 Caulk exterior and interior joints around window frames, door frames, and louver frames and other
- 32 openings in exterior walls with urethane sealant.
- 33 Caulk spaces around utility penetrations through walls and floors with foam penetrant sealant.
- 34 Where subject to air infiltration, caulk spaces between wall framing members and windows, doors, and
- 35 other openings in exterior walls with foam air-infiltration sealant.
- 36 Caulk space beneath exterior wall base plates with foam air infiltration sealant.
- 37 Caulk with silicone sealant where shown on Drawings.
- 38
- 39 **CLEANING AND REPAIRING**
- 40 Remove excess material as work progresses and leave surfaces neat, smooth, and clean.
- 41 Remove debris from project site upon work completion or sooner, if directed.
- 42 Including work of other sections, clean, repair and touch-up, or replace when directed, products which
- 43 have been soiled, discolored, or damaged by work of this section.
- 44
- 45 **PROTECTION**
- 46 Protect other work against damage and discoloration caused by work of this section.
- 47
- 48
- 49

END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Special doors operating in various methods and for various uses including hardware and controls.
5

6 SUBMITTALS
7 Provide in accordance with Section 01 33 00.

8 Shop Drawings:
9 Show elevations, principal construction features, and dimensions of each door type and frame type,
10 cut-outs, reinforcement, joints, welds, finish, anchoring and other pertinent details.
11 Locate and detail field splice joints for frames too large to ship in one piece.
12 Indicate instructions for making field splices.
13 Manufacturer's published details may be substituted for standard stock items, provided required
14 information is included.

15 Certificates:
16 Furnish letter from manufacturer stating that the work delivered to project conforms to these
17 Specifications.
18 Label on each unit, as defined in this section, may be substituted, at Contractor's option.
19

20 REGULATORY REQUIREMENTS
21 Fabricate doors, where scheduled to be fire-resistive, in accordance with Underwriters Laboratories
22 requirements. Affix U.L. Acceptance Label on each piece.
23

24 DELIVERY, STORAGE, AND HANDLING
25 Protect against damage and discoloration.
26

27 ENVIRONMENTAL REQUIREMENTS
28 Protect contacting dissimilar materials against electrolytic corrosion.
29

30 COORDINATION
31 Coordinate with other trades affecting or affected by work of this section.
32

33 **PART 2 - PRODUCTS**

34 WALL ACCESS DOORS
35 Type: Flush, side hinged, size as shown on Drawings.
36 Manufacturer: J.L. Industries, Milcor Inc., Larsen's, or accepted substitute.
37 Material: 14 gauge door, 16 gauge frame, prime coated steel.
38 Provide appropriate U.L. fire-resistance rating where doors are located in fire walls.
39 Hardware: Concealed type hinges.
40 Locks: Cylinder lock. Furnish with two keys per lock.
41
42

43 **PART 3 - EXECUTION**

44 EXISTING CONDITIONS
45 Verify that openings to receive doors are square, plumb, and accurately sized and located. Prior to
46 starting work notify General Contractor of defects requiring corrections.
47 Do not start work until conditions are satisfactory.
48
49

50 INSTALLATION
51 Install access doors and hardware in accordance with manufacturer's directions and approved shop
52 drawings.
53 Accurately locate and anchor members plumb, square, true, rigid, secure, and with proper clearances.
54

55 ADJUSTMENTS
56 Adjust moving parts to operate satisfactorily at time of project final acceptance and during warranty
57 period.
58
59

ACCESS DOORS & FRAMES

08 31 13-2

- 1 **PRODUCT CLEANING AND REPAIRING**
- 2 Including work of other sections, clean, repair and touch-up, or replace when directed products which
- 3 have been soiled, discolored, or damaged by work of this section.
- 4 Leave surfaces ready for painting specified in Section 09 90 00.
- 5 Remove debris from project site upon work completion or sooner, if directed.

- 6
- 7 **PROTECTION**
- 8 Protect other work against damage and discoloration caused by work of this section.
- 9

10
11 **END OF SECTION**

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Light gage metal framing, acoustical treatment, gypsum board with paper or vinyl facings, and finishing of
5 board joints.

6
7 **REFERENCES**

8 Conform to Recommended Specifications for the Application and Finishing of Gypsum Board,
9 GA-216-1989, and "Recommended Specification: Levels of Gypsum Board Finish" as modified and
10 supplemented herein.

11 Recommended material and methods are mandatory; those proposed by Contractor as equal or
12 equivalent must be accepted by Architect.

13 Referenced Specifications may be obtained from Gypsum Association, 810 1st Street NE, Suite 510,
14 Washington D.C. 20002; 310 277-8686.

15
16 **PERFORMANCE REQUIREMENTS**

17 Maximum ceiling deflection: 1/360 of span.

18 Maximum deviation from true plane: 1/8 inch per 10 ft. and 1/16 inch in any running foot.

19
20 **REGULATORY REQUIREMENTS**

21 Where fire-rated ceilings are noted, construct to obtain specified rating as listed and rated by
22 Underwriter's Laboratories (UL).

23
24 **DELIVERY, STORAGE, AND HANDLING**

25 Deliver products to site with manufacturer's original labels intact and legible.

26 Identify fire-rated materials with testing agency label.

27 Protect gypsum materials against damage and discoloration and metal materials against rust.

28 Do not stack gypsum board with long lengths overhanging shorter lengths.

29 Do not overload floor system with stockpiled materials.

30 Indicate adhesive "open time" on adhesive container label.

31
32 **ENVIRONMENTAL CONDITIONS**

33 Maintain between 55°F and 75°F for 24 hours before and during work, and for at least 24 hours after
34 materials have dried.

35 Maintain at least 30 ft. candles of illumination measured 3 ft. above floor in work spaces during joint
36 treatment.

37 Maintain sufficient ventilation for proper joint treatment drying.

38
39 **COORDINATION**

40 Coordinate with other trades affecting or affected by work of this section.

41
42 **PART 2 - PRODUCTS**

43
44 **STEEL STUDS**

45 Material: Steel conforming to ASTM C 645.

46 Metal Finish: Galvanized in accordance with ASTM A 591.

47 Metal thickness:

48 Adjacent to door jamb: 20 gage.

49 6" and wider studs: 20 gage.

50 Elsewhere: 25 gage.

51 Accessories: Provide as required for complete installation.

52
53 **DEFLECTION TRACK**

54 Material: Steel conforming to ASTM C 645.

55 Metal Finish: Galvanized in accordance with ASTM A 591.

56 Type: Slotted deep leg.

57 Metal thickness: 25 gage minimum.

58
59

GYPSUM BOARD

09 29 00-2

- 1 FRAMING CHANNELS
2 Hot or cold rolled, galvanized steel conforming to MLA specification 12.
3 Type and size as required to support loads.
4
- 5 FURRING CHANNELS
6 Roll-formed, hot-dipped galvanized steel, hat-shaped.
7
- 8 HANGER WIRE
9 9 ga. minimum galvanized steel wire; Fed. Spec. QQ-W-461.
10
- 11 TIE WIRE
12 Galvanized steel wire, Fed. Spec. QQ-W-461.
13
- 14 ATTACHING DEVICES
15 Hot-dipped galvanized steel wire or sheetmetal devices designed for attaching furring members to
16 supports or each other.
17
- 18 GYPSUM BOARD
19 Manufacturing Standard: ASTM C 1396.
20 Edges: Tapered
21 Type and Thickness:
22 Interior stud walls and furred ceilings: Standard board, Type X, 5/8" thick.
23 Interior ceilings: Gypsum ceiling board, 1/2" thick.
24 Restrooms and "Wet" Walls: Water-resistant board, Type X, 5/8" thick.
25
- 26 FASTENERS
27 Screws:
28 Self-tapping, self-drilling, bugle head, ASTM C 626, Type S.
29 Length: 1 5/8 inches
30 Do not use nails.
31
- 32 METAL TRIM
33 Casing Bead:
34 US Gypsum No. 200-A, 200-B, or as noted in drawings, or accepted substitute.
35 Corner Bead:
36 US Gypsum No. 101, or accepted substitute.
37 Reveal Molding:
38 Extruded aluminum, Gordon 300 Series, Fry "Z" molding, or accepted substitute.
39
- 40 JOINT TAPE
41 ASTM C 475, perforated.
42
- 43 JOINT COMPOUND
44 ASTM C 475.
45
- 46 FINISH TEXTURE
47 USG, "Spray Texture," or accepted substitute.
48 Provide at gypsum board surfaces scheduled to receive paint finish.
49
- 50 ACOUSTIC SEALANT
51 Pecora BA 98, Tremco, Miracle 21, US Gypsum, or accepted substitute.
52 Provide at toilet room perimeter walls and at walls where acoustic insulation is noted on drawings.
53
- 54 ACOUSTIC INSULATION
55 Paperless, semi-rigid, spun mineral fiber mat, NOT fiberglass, minimum 2 inches thick, minimum 2.5 pcf
56 density per ASTM C612, conforming to Federal Spec. Type 1 HH-I-521F, ASTM E136, ASTM E1050, and
57 ASTM E90. Thermafiber SAFB (Sound Attenuation Fire Blankets), Roxul AFB.
58
59

1 WATER RESISTANT SEALANT

2 Silicone with mildew inhibitor conforming to Fed. Spec. TT-S-001543; GE, Dow, or accepted substitute.
3 Clear translucent color.

4 OTHER MATERIALS

5 Made or recommended by gypsum board manufacturer.
6 Provide all indicated or required for complete installation.

7
8

9 PART 3 - EXECUTION

10

11 EXAMINATION

12 Verify that surfaces to receive gypsum board are accurately located, plumb, square, true, secure, and
13 otherwise properly prepared.

14 Prior to starting work notify General Contractor of defects requiring correction.

15 Do not start work until conditions are satisfactory.

16

17 STEEL STUD INSTALLATION**18 General:**

19 Follow manufacturer's directions.

20 Install plumb, level, true, and in accurate locations indicated.

21 Isolate stud partitions from structure to prevent transfer of loads or movement into partitions.

22 Where stud partitions stop at or slightly above ceiling, brace partition to structure as required to stabilize
23 partition.

24 Form corners and intersection with three studs.

25 Locate studs two inches from internal corners.

26 Frame for openings.

27 Provide partition-height stud adjacent to door frame jambs and secure to jambs.

28 Provide additional partition-height stud approximately 2 inches from each jamb-stud.

29 Provide reinforcing and blocking as required behind wall-mounted door stops, and to support wall-hung
30 loads such as cabinets, railings, toilet room accessories, building equipment, etc. Verify exact locations.

31 Deflection Track:

32 Provide at all full height stud walls attached to overhead roof or floor framing.

33 Attach track to overhead structure.

34 Cut studs 1" to 1 1/2" short.

35 Install studs plumb.

36 Install screws through slot into stud snug-tight, approximately centered in length of slot to allow upward
37 and downward track movement.

38

39 SUSPENDED CEILING INSTALLATION**40 General:**

41 Provide runner channels no more than 6 inches from walls and other ceiling interruptions.

42 Where mechanical and electrical equipment interfere with regular spacing of hangers provide additional
43 hangers and channels, and make necessary adjustments in ceiling construction.

44 Hangers shall not be attached to or passed through ducts.

45 Provide framing around recessed light fixtures, expansion joints, and other ceiling openings.

46 Wire Tying:

47 Use double-strand 16 gage wire.

48 Splicing: Double wrap tie.

49 Horizontal stiffeners to channel brackets: Figure-eight tie.

50 Framing members perpendicular to each other: Saddle tie.

51

52 GYPSUM BOARD INSTALLATION

53 Install board horizontally, and extend to within 1/4 inch of floor.

54 Loosely butt joints.

55 Place tapered edges together, except at angles.

56 Do not place butt ends against tapered edges.

57 Where possible apply boards without butt joints. Where butt joints are necessary, locate as far from
58 ceiling centers as possible and stagger.

59 Support board ends and edges on framing members.

- 1 Maintain 3/8 inch minimum distance between fastener and board edge.
- 2 Dimple board surface 1/32 inch with fastener; do not fracture face paper.
- 3 Secure to framing as follows:
- 4 Metal Wall Framing: Screw at 8 inches on center along board perimeter and 12 inches on center
- 5 at intermediate supports.
- 6 Metal Ceiling Framing: Screw at 8 inches on center along each support.
- 7 Provide gypsum board hood over top of any recessed lighting fixtures which penetrate fire-rated gypsum
- 8 drywall ceilings. Maintain ceiling fire-resistance rating.
- 9 **At stud walls constructed with deflection track, do not attach gypsum board to deflection track.**
- 10 **Attach gypsum board to studs only. Allow for structure deflection without loading gypsum board**
- 11 **panels.**

12

13 **JOINT, CORNER, AND EDGE TREATMENT**

- 14 Application and finishing standard: ASTM C 840.
- 15 Fill joints and fastener holes in accordance with referenced standards.
- 16 **Conform to GA 216, Level 4, light orange peel finish.**
- 17 Except at attic draft stops, fill joints and fastener holes in accordance with referenced specifications.
- 18 Reinforce inside corners in accordance with manufacturer's directions.
- 19 Protect external corners and exposed edges with metal trim.
- 20 Provide control joints, unless otherwise shown on drawings, where and if framing changes direction, and
- 21 at 30 ft. maximum spacings.

22

23 **SEALANT INSTALLATION**

- 24 Acoustic Sealant:
- 25 Provide sealant around electrical boxes, pipes, etc., located in or passing through sound walls.
- 26 Prior to installing gypsum board, provide acoustic sealant around sound wall perimeters in angle between
- 27 wall, floor and ceiling; press board into sealant forming bond between framing member face and back
- 28 side of board.
- 29 Provide in joints between sound wall perimeters and other adjacent materials.
- 30 Permit no voids for sound passage.
- 31 Water Resistant Sealant:
- 32 Provide at raw edges and around cutouts in water-resistant gypsum board.

33

34 **ACOUSTIC INSULATION INSTALLATION**

- 35 Install blankets in stud cavities. Friction fit securely between studs. Butt ends of blankets closely together
- 36 and fill all voids. When installing in multiple layers, stagger joints. When installing in one thick layer, cut
- 37 blankets vertically about 1 inch deep on a centerline between studs before gypsum board panel is
- 38 installed.

39

40 **SURFACE TEXTURE**

- 41 Walls:
- 42 Spray apply to produce light orange peel finish.
- 43 Ceilings:
- 44 Spray apply to produce light orange peel finish.
- 45 Application:
- 46 Apply after joints are taped and dry.
- 47 Follow manufacturer's directions.

48 **REPAIRS**

- 49 General:
- 50 After installation and before finishing, correct surface damage and defects.
- 51 Leave surfaces clean, smooth, and ready for finishing specified in Section 09 90 00.
- 52 Ridging:
- 53 Sand ridges smooth without cutting joint tape.
- 54 Fill concave areas on both sides of ridge with compound and finish flush and smooth.
- 55 Cracks:
- 56 Fill with compound and finish flush and smooth.

57

58 **CLEANING**

- 59 Including work of other sections, clean, repair and touch-up, or replace when directed products which

GYPSUM BOARD

09 29 00-5

- 1 have been soiled, discolored, or damaged by work of this section.
- 2 Leave surface ready for finishing specified in other sections.
- 3 Remove debris from project site upon work completion or sooner, if directed.

4

PROTECTION

- 6 Protect other work against damage and discoloration caused by work of this section.

7

8

9

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Commonly used acoustical ceiling systems, consisting of suspension system, grid, and acoustic tiles or
5 boards.

6
7 **REFERENCES**

8 Acoustic Systems:

9 Type of acoustic materials, types of mounting, noise reduction coefficients, and methods
10 of installation, hereinafter specified, refer to "Ceiling Systems Handbook," published by Ceilings and
11 Interior Systems Construction Association (CISCA), 405 Illinois Avenue, Unit 2B, St. Charles, IL 60174;
12 630-584-1919.

13 Suspension Systems:

14 Suspension systems, hereinafter specified, refer to "Metal Suspension Systems for Acoustical Tile &
15 Lay-in Panel Ceilings," ASTM C 635, and to "Recommended Practice for Installation of Metal Ceiling
16 Suspension Systems for Acoustic Tile and Lay-in Panels," ASTM C 636.

17
18 **PERFORMANCE REQUIREMENTS**

19 Suspension system components fully loaded; maximum deflection: 1/360 of span in accordance with
20 ASTM C 635.

21 Finish surfaces level and true within 1/8 inch per 12 feet.

22 Fire Resistance Classification: ASTM E 119.

23 Flame Spread Classification: ASTM E 84.

24
25 **SUBMITTALS**

26 Product Data:

27 Submit manufacturer's specifications and installation instructions for acoustical materials, suspension
28 system and accessory products required to provide a complete system.

29 Samples:

30 Submit samples of each acoustical material specified including representative grid and metal items.

31 Samples shall show full range of texture and color to be expected in completed work.

32
33 **DELIVERY, STORAGE, AND HANDLING**

34 Deliver in original, unopened, protective packages with manufacturer's labels indicating brand name,
35 pattern, size, thickness, and fire rating legible and intact.

36 Protect against damage and discoloration.

37 Store cartons open at each end to stabilize moisture content and temperature.

38
39 **ENVIRONMENTAL REQUIREMENTS**

40 Delay installation of acoustic units until work spaces are dry.

41 Maintain 65% - 75% humidity in work spaces 24 hours before, during, and 24 hours after installation.

42 Maintain uniform 55°F - 70°F temperature in work spaces 24 hours before, during, and after installation.

43
44 **EXTRA MATERIALS**

45 Submit one extra case of acoustic tile in unopened protective package. Store in Owner-approved
46 location.

47 **COORDINATION**

48 Coordinate with other trades affecting or affected by work of this section.

49
50 **PART 2 - PRODUCTS**

51
52 **ACOUSTIC TILE**

53 Type: Wet-formed mineral fiber tile, angled tegular edge.

54 Manufacturers: Armstrong, Certainteed, US Gypsum, or accepted substitute.

55 Model: Armstrong Fine Fissured, Certainteed Fine Fissured, USG Radar, or accepted substitute.

56 Size: 24 X 48 inch, 5/8 inch thick.

57 Finish: Factory applied latex paint.

58 Noise Reduction Coefficient: 0.55 minimum.

59

1 METAL SUSPENSION SYSTEM

2 Type: Steel, heavy duty rating, exposed grid T-bar system.
3 Depth: 15/16 inch.
4 Manufacturers: Donn, Armstrong, Chicago Metallic, or accepted substitute.
5 Finish: Manufacturer's standard enamel.
6 Color: Match Acoustic Tile.
7 Follow layout shown on Drawings.

8

9 FASTENERS AND ACCESSORIES**10 General:**

11 Type and sizes recommended by suspension system manufacturer.

12 Seismic Accessories:

13 Beam End Retaining Clip: Armstrong BERC or accepted substitute.
14 Main Runner Seismic Joint Clip: Armstrong MB with ES4 expansion sleeve, or accepted substitute.
15 Grid Intersection Seismic Joint Clip: Armstrong CT, or accepted substitute.

16

17 METAL EDGE TRIM

18 Corrosion-resistant steel, bonderized and enameled to match color of adjacent metal suspension system.

19

20 ACOUSTIC INSULATION

21 Paperless, semi-rigid, spun mineral fiber mat, 2 inches thick, standard density, conforming to Federal
22 Spec. HH-I-521F, Type I, ASTM C 665 and ASTM E 84. USG Thermafiber Sound Attenuation Blankets,
23 Roxul AFB, or accepted substitute.

24

25 PART 3 – EXECUTION

26

27 EXAMINATION

28 Verify that surfaces provided by other trades are clean, dry, dust-free, smooth, level, within 1/8 inch in 12
29 ft. and otherwise properly prepared to receive acoustic treatment.
30 Prior to starting work notify General Contractor of defects requiring correction.
31 Do not start work until conditions are satisfactory.

32

33 FIELD MEASUREMENTS

34 Verify prior to fabrication.
35 If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If
36 measurements differ substantially notify Architect prior to fabrication.

37

38 INSTALLATION**39 General:**

40 Follow standard specifications, manufacturer's directions and layout drawings, except as modified
41 hereunder.

42 Metal Suspension System:

43 Where mechanical and electrical work interferes with regular spacing of hangers provide additional
44 hangers and channels and make necessary adjustments in ceiling construction.

45 Do not attach or pass hangers through mechanical or electrical ductwork.

46 Provide framing around recessed light fixtures and other openings.

47 Maximum vertical hanger splay: 5 inches per 4 ft.

48 Acoustical Units:

49 Install units in level plane, in straight line courses, and with solid bearing on support members.

50 Minimum border unit width: 1/2 unit dimension, unless otherwise shown on Drawings.

51 Install pattern grain, if any, in one direction.

52 Seal joints around pipes, ducts, and other penetrations with sealant specified in Section 07900.

53 Where tile abuts vertical surfaces trim joints with metal edge trim. Attach trim to vertical surface with
54 mechanical fasteners.

55 Hold Down Clips:

56 Provide at fire-rated ceilings, unless otherwise UL approved.

57 Acoustic Insulation:

58 Provide between framing members butting joints tight with no voids.

59

ACOUSTICAL CEILINGS

09 51 00-3

- 1 CLEANING AND REPAIRING
 - 2 Including work of other sections, clean, repair and touch-up, or replace when directed products which
 - 3 have been soiled, discolored, or damaged by work of this section.
 - 4 Remove debris from project site upon work completion, or sooner, if directed.
 - 5
 - 6 PROTECTION
 - 7 Protect other work against damage and discoloration caused by work of this section.
 - 8
 - 9
 - 10
- END OF SECTION

1 **PART 1 - GENERAL**

2
3 SECTION INCLUDES
4 Sheet vinyl, resilient tile, and linoleum flooring. Preparation of substrate surfaces. Resilient bases and
5 accessories.

6
7 SUBMITTALS
8 Provide in accordance with Section 01 33 00.

9 Samples:
10 One 3 X 6 inch sample of specified sheet vinyl flooring.
11 One 12 inch long sample of each edge strip.

12 Maintenance Instructions:
13 In accordance with Section 01 33 00, submit manufacturer's recommended maintenance products and
14 methods to General Contractor, for inclusion on Owner's maintenance manual.

15
16 **QUALITY ASSURANCE**

17 General:
18 Standards: Meet requirements of Resilient Floor Covering Institute.
19 Testing: Owner will employ services of an independent testing laboratory for testing moisture content in
20 concrete slabs in accordance with the requirements of ASTM F 1869 Standard Test method for
21 measuring vapor emission rate of concrete subfloor using anhydrous calcium chloride.
22 Installer Qualifications: Installer experienced in the installation of resilient flooring products in projects of
23 comparable size and complexity as this project and who is acceptable by the product manufacturer.

24
25 **DELIVERY, STORAGE AND HANDLING**
26 Deliver in unopened packages, manufacturer's original labels thereon.
27 Matching coverings shall bear manufacturer's run number.
28 Do not remove labels or open packages until Architect inspects.
29 Protect against damage and discoloration.
30 Store in dry place.
31 Maintain storage place temperature above 70°F for immediate 48 hours prior to and during storage.

32
33 **ENVIRONMENTAL REQUIREMENTS**
34 Work Space Air and Surface Temperatures:
35 Not less than 70°F 48 hours before, during, and 48 hours after laying.
36 Not lower than 55°F thereafter.

37 Work Space Ventilation:
38 When using offensive odor adhesive provide sufficient ventilation to maintain healthy and pleasant
39 environment for all trades.

40 Work Space Illumination:
41 Do not work under less than 30 foot candles measured 3 ft. above floor.

42
43 **COORDINATION**
44 Coordinate with other trades affecting or affected by work of this section.

45
46 **PART 2 - PRODUCTS**

47
48 **SHEET VINYL**
49 Manufacturing Standard: ASTM F 1303, Type I, Grade 1, Class B backing. ISO 10582, Type I.
50 Manufacturer and type: Armstrong Rejuvenations Ambigu Collection, or accepted substitute.
51 Thickness: 0.080"
52 Color: Selected by Architect from manufacturer's standard colors.

53
54 **RUBBER BASE**
55 Manufacturer: Armstrong, Flexco, Burke, Roppe, or accepted substitute.
56 Height: 4 inches or 6 inches as scheduled on Drawings.
57 Type: Coved.
58 Provide with factory formed external corners, mitered internal corners and factory-formed end stops.
59 Color: Selected by Architect from manufacturer's standard colors.

RESILIENT FLOORING

09 65 00-2

- 1 EDGING STRIPS
2 One inch wide, 1/8 inch thick, rubber base with beveled top.
3 Provide at exposed resilient flooring edges, if any.
4
5 PRIMER, SEALER, CRACK FILLER, AND ADHESIVE
6 Water-resistant type, made or approved by covering manufacturer.
7
8 CLEANER
9 Neutral type approved by covering manufacturer.
10
11 FLOOR POLISH
12 Non-slip, non-yellowing type approved by floor covering manufacturer.
13

PART 3 - EXECUTION

- 14
15
16 EXAMINATION
17 Verify that surfaces to receive work specified herein are solid, dry, clean, level, and otherwise properly
18 prepared.
19 Verify that walls to receive base extend to within 1/4 inch of floor.
20 Prior to starting work notify General Contractor of defects requiring correction.
21 Do not start work until conditions are satisfactory.
22

- 23 PREPARATION
24 Fill concrete slab cracks less than 1/16 inch wide and depressions less than 1/8 inch deep with crack
25 filler. Notify General Contractor to correct wider cracks and deeper depressions.
26 Provide 1 coat of primer on sanded wood and other surfaces recommended by manufacturer.
27

- 28 AREAS TO BE COVERED
29 In Spaces Scheduled to have Floor Covering:
30 Also cover closet and alcove floors opening off spaces, if any, with same material.
31 Where Base is scheduled:
32 Provide around perimeter of room or space, unless otherwise indicated elsewhere.
33 Include casework, free-standing columns, pilasters and other projections, if any.
34 Miscellaneous:
35 Covering not required under permanently built-in casework and equipment, unless otherwise indicated
36 elsewhere.
37

- 38 INSTALLATION
39 General:
40 Follow manufacturer's instructions and applicable sections of referenced specifications.
41 Sheet Vinyl Flooring:
42 Install with adhesive over entire floor area to be covered.
43 Edging Strips:
44 Provide wherever covering edges are exposed.
45

- 46 PATCHING
47 General:
48 Where alterations occur, and where indicated, patch existing covering to remain; match existing material,
49 pattern, and color.
50 Join new covering neatly with existing covering in as good condition as found.
51 Base:
52 Patch existing base with 4 ft. minimum length pieces.
53

- 54 CLEANING, REPAIRING, AND FINISHING
55 After covering and base have set sufficiently, wash with cleaner.
56 After rinsing and drying apply one coat of floor polish to covering. Machine-buff to smooth, dull gloss;
57 hand-buff inaccessible areas.
58 Leave surfaces smooth and defect-free.
59 Remove debris from project site upon work completion or sooner, if directed.

RESILIENT FLOORING

09 65 00-3

1 Including work of other sections, clean, repair and touch-up, or replace when directed products which
2 have been soiled, discolored, or damaged by work of this section.

3

4 **PROTECTION**

5 Protect other work against damage and discoloration caused by work of this section.

6 Rope off work areas and/or provide necessary coverings to protect work of this section.

7

8

9

END OF SECTION

1 **PART 1 - GENERAL**

2
3 **SECTION INCLUDES**

4 Exterior and interior painting with transparent or opaque finishes. Includes stains, varnishes, lacquers,
5 fillers, and preparation of surfaces.

6
7 **SUBMITTALS**

8 Provide in accordance with Section 01 33 00.

9 Product List:

10 Before ordering, submit complete and detailed list of materials proposed for use.

11 Obtain Architect's acceptance before ordering.

12 Provide product data for field-applied interior paints and coatings which have a potential impact on indoor
13 air quality, including manufacturer's MSDS sheets or other Product Data listing VOC content as noted
14 below.

15 Provide product data for exterior field-applied paints and coatings, which have a potential impact on
16 ambient air quality, including manufacturer's MSDS sheets or other manufacturer's Product Data listing
17 VOC content as noted below.

18 Color Samples:

19 One Sample of each required finish, color, and sheen. Sample size 8 1/2 X 11 inches, minimum.

20 Use suitable substrate for each sample, such as stiff paper for paint and specified wood for stains.

21 Obtain Architect's acceptance before proceeding with work.

22
23 **QUALITY ASSURANCE**

24 Each product container shall bear manufacturer's legible label indicating the following:

- 25 Manufacturer's Name
- 26 Type of Material
- 27 Manufacturer's Product Number
- 28 Manufacturer's Batch Number
- 29 Color
- 30 Instructions for reducing, where applicable.

31
32 **DELIVERY, STORAGE, AND HANDLING**

- 33 Deliver in original, unopened containers.
- 34 Do not open containers or remove labels until Architect inspects.
- 35 Store in suitable location where directed by General Contractor.
- 36 Protect against contamination by foreign matter.
- 37 Remove unacceptable materials from project site.

38
39 **ENVIRONMENTAL REQUIREMENTS**

- 40 Follow manufacturer's directions.
- 41 Minimum ambient air and surface temperature for 24 hours prior to and during application and until film is
42 dry hard thereafter: 40°F.
- 43 Do not work where dust or insects are present.
- 44 Do not work where inclement weather may damage surface.
- 45 Do not work with less than 30 foot candles of available light measured 3 ft. above floor.

46
47 **EMISSIONS STANDARDS**

48 Conform to the following minimum standards for coating emissions:

49 Coating Type	VOC Limits	Standard
50 Architectural Flat Paints – Interior	50 g/L	Green Seal GS-11
51 Architectural Non-Flat Paints - Interior	150 g/L	Green Seal GS-11
52 Primer or Undercoat	150 g/L	Green Seal GS-11
53 Anti-Corrosive Coating	250 g/L	Green Seal GS-11
54 Clear Wood Finishes - General	350	SCAQMD Rule 1113
55 Clear Wood Finishes – Varnish	350	SCAQMD Rule 1113
56 Clear Wood Finishes – Sanding Sealer	275	SCAQMD Rule 1113
57 Clear Wood Finishes – Lacquer	550	SCAQMD Rule 1113
58 Clear Wood Finishes – Pigmented Lacquer	550	SCAQMD Rule 1113
59 Stains – Interior	250	SCAQMD Rule 1113

1 EXTRA STOCK
2 Leave, in previously unopened original containers, one gallon of each top coat.
3 Label for positive identification.
4 Store on project premises where directed.
5

6 COORDINATION
7 Coordinate with other trades affecting or affected by work of this section.
8

9 **PART 2 - PRODUCTS**

10 GENERAL
11 Products for each general purpose shall be of same manufacturer.
12 Do not use products of different manufacturers over one another, except for shop prime coats specified in
13 other sections of these Specifications.
14

15 MATERIALS
16 Select from the following Approved Products Table unless otherwise specified herein.
17 All listed products will not necessarily be employed on this project. Consult painting schedule for required
18 materials.
19 Product numbers are given to establish desired quality and do not indicate color.
20

21 COLORS
22 Noted on Drawings.
23

24 MIXING AND TINTING
25 Deliver paints and enamels ready-mixed to jobsite.
26 Job-mix and job-tint only when acceptable to Architect.
27 Mix only in clean, rust-resistant containers.
28 Use tinting colors recommended by manufacturer for specific type of surface.
29 Factory-add fungicidal agent to all exterior coatings and to interior coatings applied in any high humidity
30 spaces.
31

32 **PART 3 - EXECUTION**

33 EXAMINATION
34 Examine surfaces to receive coating for conditions that will adversely affect execution, permanence, and
35 Work quality.
36 Verify that General Contractor has removed door hardware.
37 Prior to starting work notify General Contractor about defects requiring correction.
38 Do not start work until conditions are satisfactory.
39

40 PREPARATION
41 Protection:
42 Cover or otherwise protect work of other trades, including walls and floors of paint storage and mixing
43 rooms.
44 Remove finish hardware, accessories, plates, lighting fixtures, and similar items. Obtain Architect's
45 approval for protection in lieu of removal.
46 Post signs and install barricades as required to protect work of this section against damage or
47 discoloration.
48 Take extraordinary care to prevent fire. Open cans of paint and varnish only when needed.
49 Keep rubbing cloths and oily rags submersed in water.
50

51 Surface Preparation:
52 General: Remove any loose material, dirt, or dust.
53 Galvanized Metal: Thoroughly clean with surface conditioner in accordance with manufacturer's
54 instructions.
55 Etch metal with metal conditioner or in accordance with Steel Structures Painting Council Specification 7.
56 Non-Galvanized Steel: Remove any rust and scale.
57 Wood Doors: Lightly hand block-sand faces and edges with 180 grit sandpaper to remove any raised
58 grain. Remove sanding dust residue.
59

- 1 Fill any Voids. At natural finish, color filler to match wood.
- 2 Other Wood: Clean soiled surfaces with alcohol or approved.
- 3 Hand block-sand with 180 grit sandpaper to remove any raised grain. Remove sanding dust residue.
- 4 At opaque coating seal knots, pitch, and resinous sapwood before prime coat application.
- 5 Fill voids, cracks, and other defects. At natural finish, color filler to match wood.
- 6 Remove gloss by washing and sanding; touch-up bare spots with proper type primer.

7

8 **COATING APPLICATION**

9 General:

- 10 Follow manufacturer's directions.
- 11 Do not apply initial coating until moisture content of surface to be finished is within limitations recommended by paint manufacturer. Test with moisture meter.
- 12 Apply coating with suitable brushes, rollers, or spraying equipment as recommended by coating manufacturer.
- 13 Do not exceed coating manufacturer's application rate.
- 14 Follow coating manufacturer's recommended drying time between succeeding coats.
- 15 Apply finish coats smooth, free of brush marks, streaks, laps, coating pile-up, and skips.
- 16 Keep brushes, rollers, and spraying equipment clean, dry, free from contaminates, and suitable for finish required.
- 17 Leave moldings and ornaments clean and true to detail without excessive coating build-up in corners and depressions.
- 18 Where paint abuts other materials or colors, cut paint edges clean and sharp and with no overlap.
- 19 Finish door tops, bottoms and edges as specified below: Remove doors from frames, if necessary.

24 Painted Work:

- 25 Woodwork: Immediately upon jobsite delivery prime woodwork including back-side surfaces.
- 26 Fill voids, cracks, nail holes and other defects. At natural finish, color filler to match wood.
- 27 Flat Metalwork except Doors: Apply paint with brush, roller or airless spray equipment.
- 28 Doors: Apply paint with roller or airless spray equipment only, do not apply with brush.

29 Face runs not permitted.

30 Stained and Natural Work:

- 31 Adjust finishes where necessary to obtain similar appearance between different adjacent materials.

32

33 **FIELD QUALITY CONTROL**

- 34 For each required color scheme, request Architect to inspect first finished room, space, or item for color, texture, and workmanship.
- 35 Dry paint film thicknesses will be measured upon painting completion using Tooke Paint Inspection Gage IV, a precision instrument designed for measuring and evaluating paint coatings. Re-coat any Work measuring less than specified thickness.

39

40 **CLEANING**

- 41 Remove spills, splatters, and stains from all surfaces including other work and those in paint storage and mixing rooms.
- 42 Unless otherwise approved, refinish entire wall or surface where portion of finish has been damaged or is otherwise unacceptable.
- 43 Remove debris from project site upon work completion or sooner, if directed.
- 44 Including work of other sections, clean, repair and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by work of this section.

48

49 **PAINTING SCHEDULE**

50 General:

- 51 Prime coats specified below may be omitted where factory-applied shop coats are specified in other Sections.
- 52 Prime coats specified may be omitted from existing finished surfaces, provided existing coating is sound.
- 53 Number of coats hereunder specified is minimum. Finished work shall be even, uniform color, and free from cloudy and mottled surfaces. Apply additional coats where necessary for any deep tone colors.
- 54 Minimum coating thicknesses specified below include prime coat and finishing coats combined.
- 55 Surfaces not coated, unless otherwise shown on Drawings:

- 56 Items having complete factory finish.

59 Rubber.

- 1 Non-ferrous metal.
- 2 Elastomeric sealants.
- 3 Tempered hardboard.
- 4 Acoustic tile.
- 5 Glass.
- 6 Flooring.
- 7 Fire-resistance rating labels and instructional labels.
- 8 Portions of buildings where no alterations occur, except as noted on Finish Schedule on Drawings.
- 9 Exterior Galvanized Steel:
- 10 Paint System - 1: Alkyd Enamel
 - 11 One coat galvanized iron primer, 4.5 mils.
 - 12 One coat semi-gloss alkyd enamel, 3.0 mils.
 - 13 Total minimum dry thickness: 7.5 mils.
- 14 Paint System – 2: Latex Enamel
 - 15 One coat water base galvanized iron primer, 2.5 mils.
 - 16 Two coats semi-gloss latex enamel, 2.6 mils.
 - 17 Total minimum dry thickness: 5.1 mils.
- 18 All Other Exterior Ferrous Metal:
- 19 Paint System - 3: Alkyd Enamel
 - 20 One coat ferrous metal primer, 5.0 mils.
 - 21 One coat semi-gloss alkyd enamel, 3.0 mils.
 - 22 Total minimum dry thickness: 8.0 mils.
- 23 Paint System – 4: Latex Enamel
 - 24 One coat ferrous metal primer, 2.5 mils.
 - 25 Two coats semi-gloss latex enamel, 2.6 mils.
 - 26 Total minimum dry thickness: 5.1 mils.
- 27 Exterior Non-ferrous Metal:
- 28 Paint System – 5: Latex Enamel
 - 29 Two coats self-priming semi-gloss latex enamel, 2.6 mils.
 - 30 Total minimum dry thickness: 2.6 mils.
- 31 Exterior Woodwork:
- 32 Paint System - 6: Transparent Stain
 - 33 One coat semi-transparent penetrating oil stain.
 - 34 Apply stain to all surfaces of siding by dipping.
 - 35 Apply second coat after siding installation by brush, roller or spray.
- 36 Paint System - 7: Solid Color Stain
 - 37 One coat heavy-bodied ****solvent base ****water base stain.
 - 38 Apply to all surfaces of siding by dipping.
 - 39 Apply second coat after siding installation by brush, roller or spray and back-roll.
- 40 Paint System 8: Latex Enamel
 - 41 One coat exterior water base primer, 1.4 mils.
 - 42 Two coats satin exterior latex enamel, 2.6 mils.
 - 43 Total minimum dry thickness: 4.0 mils.
- 44 Exterior Wood Doors:
- 45 Paint System - 9: Stain and Varnish
 - 46 One coat semi-transparent penetrating oil stain.
 - 47 One coat clear sanding sealer, 1.0 mils.
 - 48 Three coats satin gloss urethane varnish, 5.1 mils.
 - 49 Total minimum dry thickness: 6.1 mils.
- 50 Interior Gypsum Board Ceilings:
- 51 Paint System - 14: Latex Enamel
 - 52 One coat wallboard primer, 1.6 mils.
 - 53 Two coats flat latex enamel, 2.6 mils.
 - 54 Total minimum dry thickness: 4.2 mils.
- 55 Interior Gypsum Board:
- 56 Paint System - 15: Latex Enamel
 - 57 One coat wallboard primer, 1.6 mils.
 - 58 Two coats eggshell gloss latex enamel, 2.6 mils.
 - 59 Total minimum dry thickness: 4.2 mils.

PAINTING & COATING

09 90 00-5

- 1 Interior Gypsum Board in Wet Areas:
- 2 Paint System - 16: Epoxy Enamel
- 3 One coat water base primer, 1.6 mils.
- 4 Two coats eggshell gloss water-based catalyzed epoxy enamel, 6.0 mils.
- 5 Total minimum dry thickness: 7.6 mils.
- 6 Interior Ferrous Metals:
- 7 Paint System - 17: Alkyd Enamel
- 8 One coat solvent base primer, 3.0 mils.
- 9 Two coats semi-gloss alkyd enamel, 2.6 mils.
- 10 Total minimum dry thickness: 5.6 mils.
- 11 Interior Ferrous and Non-ferrous Metal:
- 12 Paint System - 18: Latex Enamel
- 13 One coat metal primer, 2.5 mils.
- 14 Two coats semi-gloss latex enamel, 2.6 mils.
- 15 Total minimum dry thickness: 5.1 mils.
- 16 Exposed Mechanical and Electrical Work except in Mechanical or Electrical Equipment Rooms:
- 17 Paint System -26: Exterior metal work including that on roof:
- 18 Prepare and paint as specified for other exterior metal of same kind.
- 19 Paint System - 27: Interior metal work:
- 20 Prepare and paint as specified for other interior metal of same kind.
- 21 Paint System - 28: Electrical conduit, panel boards, and service boxes:
- 22 Prepare and paint as specified for other interior metal of same kind.
- 23 Traffic Control Markings:
- 24 Paint System - 29: Traffic paint:
- 25 One coat white traffic paint.
- 26 Paint parking stall lines 4 inches wide, and any other pavement markings shown on
- 27 Drawings. Apply straight, true, and with sharp edges.

28
29
30

END OF SECTION

APPROVED PRODUCTS TABLE

Manufacturers ▲ Products ▼	Benjamin Moore	Miller	PPG	Rodda Cloverdale	Sherwin Williams	Other
Concrete Block Filler – water base	571	481-0-11	6-7	501901	B25W25	
Masonry Primer Sealer – water base	609	620-0-XX	4-808	501601	A24W300	
Wood Primer Sealer – water base	027	270-0-11	17-921X1	501601	B42W08041	
Galvanized Iron Primer – water base	HP04	310-2-10	4020PF	501601	B66W1	
Ferrous Metal Primer – water base	HP04	310-2-10	4020PF	70323	B66W1	
Heavy-bodied Stain – water base	610	Storm 412XX	FLD 820	70303	A15W00053	Olympic, Cabot,
Exterior Satin Enamel – water base	448	320-4-00	6-2045XI	532201	A82W00107	
Exterior Semi-gloss Enamel – water base	449	320-5-XX	PP919	542001	A08W00116	
Elastomeric Coating – water base	359	550-2-XX	4-110XI	511301	A5-600	
Epoxy Enamel Semi-gloss – water base	V341	183-5-10	16-510	70503	B70/B60V25	
Enamel Undercoat – water base	027	270-0-11	17-921X1	502001	B28W02600	
Wallboard Primer – water base	534	220-0-11	6-2	503601	B28W02600	
Interior Eggshell Enamel – water base	537	120-3-XX	6-4310XI	523601	B20-2600	
Interior Satin Enamel – water base	538	120-4-00	6-4410XI	533001	A87W011XX	
Interior Semi-gloss Enamel – water base	539	120-5-73	4216 HP	543601	B31W046XX	
Dry Fall – water base	395	181-1-11	6-725XI	513801	B42W1	
Interior Stain – water base	1WB1300	700	DFT300	06680	618074444	Varathane
Urethane Varnish Gloss – water base	422		DFT157	59324	A68V00091	
Urethane Varnish Satin – water base	423		DFT159	59314	A68F00090	
Traffic Paint – White	TP-22XX	8001	11-53	57341A	TM2152	
Traffic Paint – Yellow	TP-32XX	8013	11-54	57342A	TM2153	

PART 1 - GENERAL**BASIC MECHANICAL MATERIALS & METHODS - GENERAL**

Work related to this Section is specified in other sections. Other sections of these Specifications also apply even though not described here.

The Work under Division 23, Mechanical is to be finished and installed by experienced workers skilled in the disciplines as described herein. References to specific sections:

Mechanical/HVAC:

Section 23 01 00: Basic Mechanical Materials & Methods

Section 23 01 30: HVAC Duct Cleaning

Section 23 05 00: Common Work Results for HVAC

Section 23 05 48: Vibration and Seismic Controls for HVAC Piping and Equipment

Section 23 05 93: Testing, Adjusting, & Balancing for HVAC

Section 23 07 00: Insulation - External Ductwork Insulation

Section 23 08 00: Commissioning of HVAC

Section 23 05 00: Common Work Results for HVAC

The Contractor may be qualified for one or more of the disciplines listed. Where the Contractor is not qualified under the conditions of these specifications, Contractor must subcontract to a qualified firm as listed above to accomplish the Work.

WORK INCLUDED

Provide labor and materials for a complete installation of HVAC systems as specified and as described on the Drawings. HVAC systems to include electrical power, venting, ductwork, air terminal devices, balancing, insulation, supports, and controls as required for complete and functional system(s).

The Contractor is responsible for installation, balancing, testing, startup, and operational checkout for a fully functional system. Provide check-out and start-up of all mechanical & plumbing systems in accordance with manufacturer procedures and specifications. Install all Work parallel and plumb to building lines, unless otherwise indicated.

The Drawings and Work Scope are not intended to be comprehensive of all Work to be done under this Contract. Specifications, Drawings, and Work Scope must be used in their entirety to develop full understanding of the Work to be done under this Contract.

RELATED WORK

The Contractor is responsible to provide all labor, equipment and materials to complete all mechanical work indicated, specified within Division 23, or obviously necessary and required for a fully operational system. The Contractor is also responsible for proper location and sizes for sleeves, building penetrations, hangers, and supports for mechanical materials and equipment.

The Contractor is responsible for all work, if required, requiring subcontractors, such as electrical, trenching plus backfilling, chases, framed openings, furring, patching, painting, roofing, curbing, blocking, and related general work.

Coordinate all Work with various trades. Cutting of structural members not permitted, except as approved by a Structural Engineer.

REFERENCES AND STANDARDS

ANSI: American National Standards Institute

ASHRAE: American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc.

ASME: American Society of Mechanical Engineers.

ASTM: American Society for Testing and Materials.

AWWA: American Water Works Association.

Fed. Spec.: Federal Specifications

IAPMO: International Association of Plumbing and Mechanical Officials.

OEF: ASHRAE 90.1 Energy Standard

1 OFC: 2019 Oregon Fire Code.

2 OMSC: 2019 Oregon Mechanical Specialty Code

4 ELECTRICAL WORK

5 Division 26 specifies electrical work including wiring, conduit, disconnect switches, mounts starters,
6 convenience outlets for equipment service, and makes line voltage connections to equipment furnished
7 under Division 23, unless noted under specific item. Electrical to provide convenience outlet within 25-
8 feet of all HVAC equipment for maintenance service per IMC adopted by Oregon Specialty Code.

9
10 Section 23 09 23 provides control wiring, and conduit, except as indicated, to conform with Division 26
11 wiring methods.

13 PERMITS, CODES, AND STANDARDS

14 Install all work in accordance with applicable codes and standards and in accordance with manufacturer's
15 current specifications. Include all permits and inspections required by applicable codes pertaining to work
16 in this Specification.

18 VISITING JOB SITE

19 Existing conditions may affect extent of Work. Additional costs will not be authorized for omission in Bid
20 due to lack of understanding of the Scope of Work.

22 SUBMITTALS

23 Shop Drawings:

24 After award of Contract, provide shop drawings which have been reviewed and approved by Contractor,
25 and literature showing item used, size, dimensions, capacity, rough-in, etc.

26
27 From manufacturer, detailing equipment assemblies and indicating dimensions, weights, loadings, required
28 clearances, method of field assembly, components, and location and size of each field connection.

29
30 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between
31 manufacturer installed and field installed wiring.

32
33 The Contract Drawings indicate the general layout of piping and various items of equipment.
34 Coordination with other trades and with field conditions will be required. For this purpose, prepare Shop
35 Drawings of all equipment installations. Shop Drawings shall be drawings prepared by Contractor and
36 not reproductions or tracings of Architect's Drawings. Overlay drawings with shop drawings of other
37 trades and check for conflicts. All drawings shall be same size as Architect's Drawings with the title block
38 similar to Contract Drawings and identifying Architect's Drawing number or any reference drawings. All
39 drawings shall be fully dimensioned including both plan and elevation dimensions. Shop drawings cannot
40 be used to make scope changes.

41
42 Shop drawings shall include but are not limited to:

43 Site plan to same scale as Architect's Drawing.

44
45 Complete floor plans with sheet metal and HVAC to a minimum mechanical and fan rooms and sections
46 of congested areas to a minimum of 1/4-inch scale.

47
48 Fabricated Equipment: Scale and drawing sizes to suit contractor except equipment shall not be less
49 than a 1/4-inch scale.

50
51 Submit shop drawings for review prior to beginning fabrication. Additional shop drawings may be
52 requested when it appears that coordination issues are not being resolved in the field or when there is a
53 question as to whether contract documents are being complied with or the design intent is being met.

54
55 Product Data: Include rated capacities for each model; shipping, installed and operating weights;
56 furnished specialties; and accessories for each type of product specified.

57
58 Provide submittal data for the following items within 20 days of award of Contract for Contractor review
59 and approval per Contract Documents:

- 1 Mechanical/HVAC
- 2 Air Systems
- 3 Insulation - Duct
- 4 Grilles and Registers
- 5 Filters
- 6 Certification of Balance Firm

- 7
- 8 **CERTIFICATES**
- 9 Furnish Owner with signed certificates stating that:
- 10 Systems have been thoroughly cleaned as specified.
- 11 Tests of piping have been made and satisfactorily concluded.
- 12 Lubrication of items has been completed.
- 13 Cleaned set of filter media is installed and strainers have been cleaned.

- 14
- 15 **DRAWINGS**
- 16 Mechanical drawings are diagrammatic and are intended to show the approximate location of equipment
- 17 and piping. Dimensions given in figures on the Drawings shall take precedence over scaled dimensions;
- 18 and all dimensions, whether given in figures or scaled, shall be verified in the field. All piping and
- 19 equipment shall be installed in a manner and in locations to avoid obstruction, preserve head room and
- 20 keep openings and passageways clear. Contractor is required to submit shop drawings of all work to be
- 21 installed. Any changes or modifications from Bid documents must be approved by Engineer prior to
- 22 installation.

- 23
- 24 **GUARANTEE**
- 25 Mechanical work, materials and equipment shall be free from defects and guaranteed for a period of one
- 26 year from the date of final acceptance. Any workmanship, equipment or materials proved defective due
- 27 to this Contract, shall be repaired or replaced without additional cost to the Owner.

- 28
- 29 **CLEAN-UP**
- 30 Keep the Work area in a safe, neat, and orderly condition during construction. Upon completion of work,
- 31 thoroughly clean all equipment, materials, and floor. Remove all debris or extra material resulting from
- 32 the Work.

- 33
- 34 **OPERATION AND MAINTENANCE MANUALS**
- 35 Submit three (3) sets of engineering data and/or specifications, operating and maintenance instructions,
- 36 parts lists and other relevant data for mechanical equipment. One set shall be digitized and placed on a
- 37 compact (optical) disc.

- 38
- 39 **"AS BUILT" RECORD DRAWINGS**
- 40 Maintain a marked set of prints at job site at all times. Show all changes from Contract Drawings,
- 41 whether visible or concealed. Dimension accurately from building lines, floor or curb elevations. Show
- 42 exact location, elevation and size of piping, conduit, access panels and door, and all other information
- 43 pertinent to the Work.

- 44
- 45 At project completion, submit one set of reproducible tracings to Engineer for approval.
- 46
- 47 See Contract Close-out Section for detailed requirements.

- 48
- 49 **PART 2 - PRODUCTS**

- 50
- 51 **ACCESS PANEL(S)**
- 52 Furnish all access panels required for Mechanical Work with exact directions for locations which provide
- 53 for servicing of equipment. Panels shall be of approved size, adequate for valves and equipment
- 54 requiring service and installed above solid ceilings, behind walls or in furring, complete with correct frame
- 55 for type of construction involved.

- 56
- 57 Size, quantity and location of panels are not necessarily shown on Drawings. Use no panel smaller than
- 58 18-inches by 18-inches for manual access, nor smaller than 30-inches by 30-inches where personnel
- 59 must pass through.

1
2 **ACCESS DOOR(S)**

3 Provide access doors for plenum. Access door to be minimum of 20 gauge sheet metal with 16 gauge
4 frame (minimum). Provide either continuous piano hinge of 3-inches or door latching hardware according
5 to SMACNA "HVAC" Duct Construction Standards.

6
7 Approved Manufacturer/Model Numbers:

8 Barry Blower

9 Other Acceptable Manufacturers Similar to Approved Manufacturer/Model Numbers:

10 By Substitution Request

11
12 **SEISMIC RESTRAINTS AND BUILDING JOINTS**

13 General: Provide resilient earthquake restraints with suitable structural support for all equipment as
14 specified herein and shown on the Drawings. Restraints shall be attached to structural members capable
15 of withstanding the design dynamic load specified below. Contractor shall be responsible for ensuring
16 that the dynamic load capacity of the attachment bolts and supporting structure is greater than or equal to
17 the capacity of the seismic restraint. Contractor shall also coordinate the size of concrete piers and
18 housekeeping pads to ensure adequate space for the isolators and the restraints. Design of the seismic
19 restraints shall be stamped and signed by a registered engineer.

20
21 Suspended air handling units, fan coil units, and fans:

22 Seismic Restraint: Slack cables rigidly attached to suspended equipment. Attachment to structure shall
23 include an interlocking steel element with a minimum 1/4-inch thick neoprene pad between the
24 interlocking steel members. Cable shall be sized to accommodate dynamic loads up to 1g in all
25 directions without failure. Cables shall be slack during normal operation of equipment and shall not
26 compromise the efficiency of the vibration isolation hangers.

27
28 Floor or Platform-mounted Equipment: Equipment with or without isolators shall be anchored to floor or
29 supporting platform structure.

30
31 Ductwork (Excluding Fire Sprinkler and Equipment):

32 All ductwork shall be provided with seismic restraints in accordance with seismic Hazard Level (SHL C) of
33 the Seismic Restraint Manual: Guidelines for Mechanical Systems dated 1998, as published by the
34 Sheet Metal and Air Conditioning Contractors National Association, Inc. and in accordance with the State
35 of Oregon, Structural Specialty Code (2019 edition).

36
37 Approved Manufacturer/Model Numbers:

38 Pipe Shields Inc.

39 Other Acceptable Manufacturers Similar to Approved Manufacturer/Model Numbers:

40 By Substitution Request

41
42 **PART 3 - EXECUTION**

43
44 **ACCESS PANELS**

45 Install access panels in accordance with manufacturers instructions for wall/ceiling type construction.
46 Panel opening, patching, and painting by Contractor.

47
48 **SEISMIC BRACING**

49 All new piping in the mechanical rooms shall comply with local codes and conform to the seismic
50 requirements to SMACNA "Seismic Restraint Manual" Guidelines for mechanical Systems, Second
51 Edition, specifically seismic bracing is required on all fuel pipe and all other piping that is 1.25 nominal
52 inches and larger in mechanical rooms and 2.5-inches and larger outside mechanical rooms.

53
54 All runs of pipe must have a minimum of two transverse braces and one longitudinal brace. A run is
55 defined as a length of pipe without any change in direction. Branch lines may not be used to brace main
56 lines.

57
58
59 **END OF SECTION**

PART 1 - GENERAL**SCOPE**

This section includes specifications for cleaning duct and HVAC systems on this project. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

Reference

Reference Standards

Quality Assurance

Shop Drawings

Design Criteria

PART 2 - PRODUCTS

General

Cleaners, Biocides and Encapsulants

Equipment

Access Doors

PART 3 - EXECUTION

General

Cleaning

Biocides and Encapsulants

Cleaning Report

Access Doors

RELATED WORK

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 23 33 00 - Air Duct Accessories

Section 23 31 00 - HVAC Ducts and Casings

Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

NADCA 1992-01 Mechanical Cleaning of Non-Porous Air Conveyance System Components
National Air Duct Cleaners Association

NADCA Understanding Microbial contamination in HVAC Systems

NAIMA Cleaning Fibrous Glass Insulated Air Duct Systems

QUALITY ASSURANCE

Refer to Division 1, Instructions to Bidders – Qualifications of Bidder and General Conditions - Equals and Substitutions.

A Regular Member in good standing of NADCA (National Air Duct Cleaners Association). Maintain membership for the entire duration of the project. Maintain a staff of at least one Certified Air System Cleaning Specialist (ASCS). If membership of the firm, or any certification of any staff performing work is terminated or expires during the duration of the project, contact Construction Manager immediately.

SHOP DRAWINGS

Refer to Division 1, General Conditions, Submittals.

Include manufacturer's data and/or Contractor data for the following:

- List of equipment to be used.
- Product description and MSDS sheets for cleaners, biocides and encapsulants.
- Access doors.

PART 2 - PRODUCTS**GENERAL**

Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke developed rating no higher than 50.

CLEANERS, BIOCIDES AND ENCAPSULANTS

Manufacturer: H.B. Fuller/Foster, Porter, or approved equal.

Cleaners, biocides and encapsulants shall be waterbase products specifically designed for application to HVAC duct interiors and capable of being applied with airless spray equipment. Biocides and encapsulants must be colored differently than substrate to be coated.

Biocidal agents to be formulated for long term fungicidal activity with no loss on aging. Biocidal agents must be registered with the U.S. Environmental Protection Agency for use on the interior of HVAC duct systems.

Cured biocides and encapsulants must provide tough washable elastic protective finish able to withstand light impact or abrasion without breaking down over time or releasing fibers.

EQUIPMENT

Particulate Collection Equipment: Fan/filter unit sized to create sufficient quantity of negative pressure for capture and filtration of air and contaminants dislodged during duct cleaning. Equipment to include prefiltration and HEPA final filtration with 99.97% collection efficiency for 0.3 micron size particles.

Portable pressure washers to be capable of 500 psig to 1000 psig operation.

Power brush systems designed specifically for duct cleaning.

PART 3 - EXECUTION

GENERAL

Use products and equipment in accordance with manufacturers instructions.

CLEANING

Clean ductwork systems and associated turning vanes, dampers, coils, drain pans, plenums, diffusers, registers, grilles and louvers; air handling units and associated fans, coils, drain pans, plenums and dampers; fans; terminal units and other equipment described below:

<u>System/Component</u>	<u>Location</u>	<u>Action</u>
Supply Duct Systems	Throughout Project	Clean
Return Duct Systems	Throughout Project	Clean
Transfer Duct Systems	Throughout Project	Clean
Exhaust/Relief Duct Systems	Throughout Project	Clean
Outside Air/Mixed Air Duct Systems	Throughout Project	Clean
Air Handling Units	Throughout Project	Clean
Exhaust Fans	Throughout Project	Clean

Visually inspect systems and site prior to cleaning. Document and report damaged system components to Owner’s Construction Representative prior to cleaning. Mark damper and other component positions prior to cleaning and reset after cleaning to original position. Establish a specific, coordinated plan detailing how each area of the building will be protected during the various phases of work.

Protect building occupants, components and furnishings from cleaning activities. Use polyethylene sheeting covers and barriers where cleaning will disperse debris outside the HVAC systems. Install critical barriers within the building, at inlets/outlets and within the system to prevent migration of dust and debris to clean areas.

Use particulate collection equipment to remove and capture debris. Connect to system downstream of cleaning operations. Wherever possible, duct exhaust to the exterior of the building. Avoid discharge near air intakes and points of entry. Arrange source of makeup air to flow from clean area to work area negatively pressurizing work area. Take measures to control offensive odors and vapors during the cleaning process.

Clean systems using mechanical cleaning methods, such as vacuum cleaning, compressed air sweeping and mechanical brushing, designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. No cleaning methods are to be used which damage components of the system or negatively alter the integrity of the system.

1 Clean fibrous glass thermal or acoustical insulation with HEPA vacuuming equipment. Document locations
2 of damage, deterioration, delamination, mold, fungus growth or excessive moisture which cannot be
3 restored by cleaning or resurfacing with repair coating. Report locations and conditions to
4 Architect/Engineer and Owner’s Project Representative for determination of removal and/or replacement.

5
6 Where fibrous glass thermal or acoustical insulation is to be removed, scrape and brush metal clean.
7 Remove loose fasteners, weld pins where required for cleaning work and sheet metal covers associated
8 with insulation. Patch and seal fastener openings.
9

10 Clean coils to restore pressure drop to within 10% of design rating. Where design rating is unknown, coils
11 must be cleaned free of foreign material and chemical residue. Cleaning methods used must not bend, erode
12 or damage coil surfaces, fins or tubes. Clean coil drain pans and drain. Make drain fully operational. Where
13 wet methods are used, thoroughly rinse coils and drains pans with clean water to remove latent residues.
14 Provide temporary drain pans below coils without drain pans to capture water.

15
16 Where systems and equipment containing filters are cleaned, obtain replacement filters from building
17 occupant and replace existing filters.
18

19 Verification of HVAC system cleanliness will be performed after cleaning and prior to application of
20 biocides and encapsulants. The Contractor shall notify the Owner’s Construction Representative and
21 Architect/Engineer in advance of verification. Verification will consist of inspection by the Contractor,
22 Owner’s Construction Representative and/or Architect/Engineer. If surfaces are visibly clean, no
23 contaminants are evident through visual inspection and coils are within 10% of design pressure drop, the
24 HVAC system shall be considered clean. However the Owner reserves the right to further verify system
25 cleanliness through third party gravimetric or wipe testing analysis per NADCA standards.

26
27 **CLEANING REPORT**

28 Provide a report describing pre-cleaning inspection and damage, systems cleaned, methods and materials
29 used, problems encountered, final verification and any remaining problems noted. Submit three copies to
30 Owner’s Construction Representative.
31

32 **ACCESS DOORS**

33 Install access doors where access is required for cleaning or inspection. See specification Section 23 33 00
34 for access door requirements.
35

36 Size and numbers of duct access doors to be sufficient to perform the intended service. Minimum access
37 door size shall be 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, or other size as
38 indicated. Install access doors on both inlet and outlet sides of reheat coils as well as other duct mounted
39 coils if not existing.
40

41
42 **END OF SECTION**
43

PART 1 - GENERAL**SCOPE**

This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Continuity of Existing Services
- Protection of Finished Surfaces
- Sleeves and Openings
- Sealing and Fire Stopping
- Equipment Furnished By Others
- Provisions for Future
- Submittals
- Off Site Storage
- Certificates and Inspections
- Operating and Maintenance Data
- Training of Owner Personnel
- Record Drawings

PART 2 - PRODUCTS

- Access Panels and Doors
- Identification
- Sealing and Fire Stopping

PART 3 - EXECUTION

- Demolition
- Excavation and Backfill
- Concrete Work
- Cutting and Patching
- Building Access
- Equipment Access
- Coordination
- Identification
- Lubrication
- Sleeves and Openings
- Sealing and Fire Stopping
- Training

RELATED WORK

Section 01 91 01 or 01 91 02 – Commissioning Process
 Section 07 84 00 - Fire Stopping
 Section 23 33 00 - Air Duct Accessories.

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

Abbreviations of standards organizations referenced in other sections are as follows:

AABC	Associated Air Balance Council
ABMA	American Boiler Manufacturers Association
ADC	Air Diffusion Council
AGA	American Gas Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
CGA	Compressed Gas Association

1	EPA	Environmental Protection Agency
2	GAMA	Gas Appliance Manufacturers Association
3	IEEE	Institute of Electrical and Electronics Engineers
4	ISA	Instrument Society of America
5	MCA	Mechanical Contractors Association
6	MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
7	NBS	National Bureau of Standards
8	NEBB	National Environmental Balancing Bureau
9	NEC	National Electric Code
10	NEMA	National Electrical Manufacturers Association
11	NFPA	National Fire Protection Association
12	SMACNA	Sheet Metal and Air Conditioning Contractors' National Association. Inc.
13	UL	Underwriters Laboratories Inc.
14	ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
15	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
16	UL1479	Fire Tests of Through-Penetration Firestops
17	UL723	Surface Burning Characteristics of Building Materials

18 **QUALITY ASSURANCE**

19 Refer to Division 1, General Conditions, Equals and Substitutions.

20
21
22 Where equipment or accessories are used which differ in arrangement, configuration, dimensions,
23 ratings, or engineering parameters from those indicated on the contract documents, the contractor is
24 responsible for all costs involved in integrating the equipment or accessories into the system and for
25 obtaining the performance from the system into which these items are placed. This may include changes
26 found necessary during the testing, adjusting, and balancing phase of the project.

27 **CONTINUITY OF EXISTING SERVICES**

28 Do not interrupt or change existing services without prior written approval from the Owner's Project
29 Representative. When interruption is required, coordinate the down-time with the user agency to
30 minimize disruption to their activities. Unless specifically stated, all work involved in interrupting or
31 changing existing services is to be done during normal working hours.

32 **PROTECTION OF FINISHED SURFACES**

33 Refer to Division 1, General Requirements, Protection of Finished Surfaces.

34
35 Furnish one can of touch-up paint for each different color factory finish which is to be the final finished
36 surface of the product. Deliver touch-up paint with other "loose and detachable parts" as covered in the
37 General Requirements.

38 **SLEEVES AND OPENINGS**

39 Refer to Division 1, General Requirements, Sleeves and Openings.

40 **SEALING AND FIRE STOPPING**

41 Sealing and fire stopping of sleeves/openings between ductwork, piping, etc. and the sleeve, structural or
42 partition opening shall be the responsibility of the contractor whose work penetrates the opening.

43 **EQUIPMENT FURNISHED BY OTHERS**

44 None

45 **SUBMITTALS**

46 Refer to Division 1, General Conditions, Submittals.

47
48 Submit for all equipment and systems as indicated in the respective specification sections, marking each
49 submittal with that specification section number. Mark general catalog sheets and drawings to indicate
50 specific items being submitted and proper identification of equipment by name and/or number, as
51 indicated in the contract documents.

52
53 Before submitting electrically powered equipment, verify that the electrical power and control
54 requirements for the equipment are in agreement with the motor starter schedule and electrical circuit on
55 the electrical drawings. Include a statement on the shop drawing transmittal to the architect/engineer that
56 the equipment submitted and the motor starter schedules are in agreement or indicate any discrepancies.
57 See related comments in Section 23 05 13 in Part 1 under Electrical Coordination.

58 Include wiring diagrams of electrically powered equipment.

59 Submit sufficient quantities of shop drawings to allow the following distribution:

60 **Sheridan Fire Station**

Seismic Upgrade

- Operating and Maintenance Manuals 2 copies (plus electronic copy)
- Testing, Adjusting and Balancing Contractor 1 copy (plus electronic copy)
- A/E 1 copy (electronic preferred)

OFF SITE STORAGE

Prior approval by the District (or their representative) and the A/E will be needed. Off site storage of equipment or materials shall be at the contractors expense unless otherwise agreed to by the District. The contractor shall take full responsibility for protection of all equipment and materials stored off site. Any damage to materials or equipment stored off site is at the Contractors risk unless otherwise agreed to by the District.

Generally, ductwork, metal for making ductwork, duct lining, sleeves, pipe/pipe fittings and similar rough-in material will not be accepted for off site storage. For material that can be stored off site, no material will be accepted for off site storage unless shop drawings for that material have been approved.

CERTIFICATES AND INSPECTIONS

Refer also to Division 1, General Conditions, Permits, Regulations, Utilities and Taxes.

Obtain and pay for all required permits and State inspections. Deliver originals of these certificates to the Division Project Representative. Include copies of the certificates in the Operating and Maintenance Instructions.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

In addition to the general content specified under GENERAL REQUIREMENTS supply the following additional documentation:

1. Records of tests performed to certify compliance with system requirements
2. Certificates of inspection by regulatory agencies
3. Copies of all approved shop drawings.
4. Temperature control record drawings and control sequences
5. Parts lists for manufactured equipment
6. Warranties
7. Additional information as indicated in the technical specification sections

TRAINING OF OWNER PERSONNEL

Instruct user agency personnel in the proper operation and maintenance of systems and equipment provided as part of this project. Include not less than 1 hours of instruction, using the Operating and Maintenance manuals during this instruction. Demonstrate startup and shutdown procedures for all equipment. All training to be during normal working hours.

RECORD DRAWINGS

Refer to Division 1, General Requirements, Record Drawings.

In addition to the data indicated in the General Requirements, maintain temperature control record drawings on originals prepared by the installing contractor/subcontractor. Include copies of these record drawings with the Operating and Maintenance manuals.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS

LAY-IN CEILINGS:

Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Section 09500 are sufficient; no additional access provisions are required unless specifically indicated.

CONCEALED SPLINE CEILINGS:

Removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used will be provided under Section 09500.

METAL PAN CEILINGS:

Removable sections of ceiling tile held in position by a pressure fit will be provided under Section 09500.

PLASTER WALLS AND CEILINGS:

16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 18" by 18". Where maintenance technician must pass shoulders through the opening for full access, minimum size shall be 24" by 24" unless a variance is granted by the Engineer on a case by case basis.

IDENTIFICATION**STENCILS:**

Not less than 1 inch high letters/numbers for marking pipe and equipment.

ENGRAVED NAME PLATES:

White letters on a black background, minimum 1/16 inch thick plastic laminate, beveled edges, screw mounting, Setonply Style 2060 by Seton Name Plate Company or Emedolite- Style EIP by EMED Co., or equal by Marking Services, or W. H. Brady. Terminal equipment shall have 1" high lettering. Equipment located in mechanical rooms, attics, boiler rooms, rooftops, or outside shall have 2" lettering unless not allowed by Architectural guidelines.

SEALING AND FIRE STOPPING**FIRE AND/OR SMOKE RATED PENETRATIONS:**

Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 "Fire Stopping".

NON-RATED PENETRATIONS:**Pipe Penetrations Through Below Grade Walls:**

In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve.

PIPE PENETRATIONS:

At pipe penetrations of non-rated interior walls, floors and exterior walls above grade, use urethane caulk in annular space between pipe insulation and sleeve. For non-rated drywall, plaster or wood walls where sleeve is not required use urethane caulk in annular space between pipe insulation and wall material.

DUCT PENETRATIONS:

Annular space between duct (with or without insulation) and the non-rated walls or floor opening shall not be larger than 2". Where existing openings have an annular space larger than 2", the space shall be patched to match existing construction to within 2" around the duct.

Where shown or specified, pack annular space with fiberglass batt insulation or mineral wool insulation. Provide 4" sheet metal escutcheon around duct on both sides of partition or floor to cover annular space.

PART 3 - EXECUTION**DEMOLITION**

Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe or duct is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the user agency to minimize disruption to the existing building occupants.

All pipe, wiring and associated conduit, insulation, ductwork, and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor. All piping and ductwork specialties are to be removed from the site by the Contractor unless they are dismantled and removed or stored by the Owner. All designated equipment is to be turned over to the Owner for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

CONCRETE WORK

All cast-in-place concrete will be performed by the Division 3 Contractor unless otherwise noted. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for support of mechanical equipment.

CUTTING AND PATCHING

Refer to Division 1, General Requirements, Cutting and Patching.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance of all apparatus or equipment. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus or equipment has been brought into the building.

EQUIPMENT ACCESS

Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Mechanical Contractor and installed by the General Contractor.

Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which do not require access panels.

COORDINATION

Verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to, diffusers, register, grilles, and recessed or semi-recessed heating and/or cooling terminal units installed in/on architectural surfaces.

Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Cooperate with the test and balance agency in ensuring Section 23 05 93 specification compliance. Verify system completion to the test and balance agency (flushing, pressure testing, chemical treatment, filling of liquid systems, proper pressurization and air venting of hydronic systems, clean filters, clean strainers, duct and pipe systems cleaned, controls adjusted and calibrated, controls cycled through their sequences, etc.), ready for testing, adjusting and balancing work. Install dampers, shutoff and balancing valves, flow measuring devices, gauges, temperature controls, etc., required for functional and balanced systems. Demonstrate the starting, interlocking and control features of each system so the test and balance agency can perform its work.

IDENTIFICATION

Engraved name plates shall be used for equipment identification.

Use engraved name plates to identify control equipment.

Label fire, smoke and combination fire smoke dampers on the exterior surface of ductwork directly adjacent to access doors using a minimum of 0.5 inch height lettering reading, "SMOKE DAMPER" or "FIRE DAMPER". Smoke and combination fire smoke dampers shall also include a second line listing the individual damper tag. The tags must be coordinated with the mechanical schedules. Utilize manufactured labels. All other forms of identification are unacceptable. All labels shall be clearly visible from the ceiling access point.

LUBRICATION

Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance with the manufacturer's instructions until the work is accepted by the Owner. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project. Provide prominently located label at each piece of equipment that requires field lubrication identifying the grease requirements, grease base type, greasing instructions, and any appropriate warnings regarding unapproved grease types.

SLEEVES AND OPENINGS

Pipe penetrations in new poured concrete horizontal construction requiring F and T rating: Form opening using hole form or core drill opening. Alternatively provide cast in place fire stopping devices/sleeves.

Pipe penetrations in new poured concrete horizontal construction requiring F rating but no T rating: Same as pipe penetrations in new poured concrete construction requiring F and T ratings except that schedule 40 steel sleeves may also be used.

Pipe penetrations in new poured concrete horizontal construction that do not require F or T ratings: Provide schedule 40 steel pipe sleeve, form opening using hole form or core drill opening.

1
2 Pipe penetrations in existing concrete floors: Core drill openings.
3

4 Pipe penetrations through existing floors located in food service areas that do not require a T rating: Core
5 drill sleeve opening large enough to insert schedule 40 sleeve, extend sleeve 2 inches above the floor
6 and grout area around sleeve with hydraulic setting, non-shrink grout. Size sleeve to allow insulated pipe
7 to run through sleeve and paint the sleeve.
8

9 Where penetrating pipe or conduit weight is supported by floor, provide manufactured product or
10 structural bearing collar designed to carry load.
11

12 DUCT SLEEVES:

13 Duct sleeves are not required in non-rated partitions or floors.
14

15 Provide sleeve required for fire dampers in fire-rated partitions and floors. Reference fire damper details
16 on drawings.
17

18 SEALING AND FIRE STOPPING

19 FIRE AND/OR SMOKE RATED PENETRATIONS

20 Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance
21 with section 07 84 00 Fire Stopping.
22

23 NON-RATED PENETRATIONS:

24 In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the
25 pipe and tighten in place, in accordance with manufacturer's instructions. Install so that the bolts used to
26 tighten the seal are accessible from the interior of the building or vault.
27

28 At all interior walls and exterior walls, pipe penetrations are required to be sealed. Apply sealant to both
29 sides of the penetration in such a manner that the annular space between the pipe sleeve or cored
30 opening and the pipe or insulation is completely blocked.
31

32 Duct penetrations through non-rated partitions shall require sheet metal escutcheons with fiberglass or
33 mineral wool insulation fill for spaces that include laboratories, clean rooms, animal rooms, kitchens, cart
34 wash rooms, janitor closets, toilet rooms, mechanical rooms, conference rooms, private consultation
35 rooms, where ducts are exposed and where noted on drawings elsewhere.
36

37 PENETRATIONS SUBJECT TO WATER INTRUSION:

38 For penetrations (both rated and non-rated) in floors subject to water intrusion or in rooms housing
39 electrical equipment (but not within walls) provide one of the following:

- 40 • Pipe penetration where steel pipe sleeve is used extend steel sleeve 2" above the floor.
- 41 • Pipe penetration where cast in place fire stopping device/sleeve is used, extend device/sleeve 2"
42 above the floor (provided it meets the device's UL listing).
- 43 • Pipe penetration where there is no steel sleeve or cast in place fire stopping device/sleeve,
44 provide 2"x 2" x 1/8" galvanized steel angles fastened to floor surrounding the penetration or
45 group of penetrations to prevent water from getting to penetration. Provide urethane caulk
46 between angles and floor and fasten angles to floor minimum 8" on center. Seal corners water
47 tight with urethane caulk.
- 48 • Duct penetrations. Provide 2"x 2" x 1/8" galvanized steel angles fastened to floor surrounding the
49 penetration or group of penetrations to prevent water from getting to penetration. Provide
50 urethane caulk between angles and floor and fasten angles to floor minimum 8" on center. Seal
51 corners water tight with urethane caulk.
52

53 Floors subject to water intrusion or rooms housing electrical equipment include the following locations:

- 54 • Food Service/Kitchen Areas
- 55 • Walk In Coolers/Freezers
- 56 • Laundries
- 57 • Restrooms
- 58 • Locker/Shower Rooms
- 59 • Janitor Rooms w/ Sinks
- 60 • Wet Laboratories
- 61 • Mechanical/Plumbing Equipment Rooms

- 1 • Swimming Pool Rooms/Pool Equipment Rooms
- 2 • Chemical/Hazardous Waste Storage
- 3 • Maintenance/Industrial Shops
- 4 • Vehicle Storage and Parking Ramps
- 5 • Greenhouses
- 6 • Data/Telecommunications Rooms
- 7 • Electrical Equipment Rooms

8
9 Provide waterproof caulk sealant top coating on fire stopping system (or other approved means to protect
10 the fire stopping system from water) in areas subject to wash down such as Food Service and Dish
11 Washing Areas.

12
13 **TRAINING**

14 All training provided for agency shall comply with the format, general content requirements and
15 submission guidelines specified under Section 01 91 01 or 01 91 02.

16
17
18

END OF SECTION

PART 1 - GENERAL

SCOPE

This section includes specifications for vibration isolation material for equipment, piping systems, and duct systems. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Quality Assurance
- Design Criteria
- Shop Drawings

PART 2 - PRODUCTS

- Materials
 - Vibration Isolation Manufacturers
 - Type 1: Neoprene Pad
 - Type 2: Neoprene Pad
 - Type 3: Unhoused Spring with Neoprene
 - Type 4: Housed Spring with Neoprene
 - Type 5: Spring Hanger with Neoprene
 - Type 6: Precompressed Spring with Neoprene
 - Type 7: Spring Hanger with Neoprene
 - Type I: Inertia Base
 - Type S: Steel Base
 - Type T: Horizontal Thrust Restraint
 - Flexible Piping Connections
- Performance
 - Blower Minimum Deflection Guide

PART 3 - EXECUTION

- Installation
 - Packaged Air Handling Units and Centrifugal Fans
 - Cooling Tower Support
 - Isolation Devices Outdoors or in High Humidity Areas

RELATED WORK

- Section 01 91 01 or 01 91 02 – Commissioning Process
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 21 23 - Hydronic Pumps
- Section 23 73 13 - Modular Indoor Central-Station Air-Handling Units
- Section 23 73 23 - Factory Fabricated Custom Air Handling Units
- Section 23 73 24 - Factory Fabricated Custom Laboratory Exhaust Energy Recovery Units
- Section 23 34 00 - HVAC Fans
- Section 23 33 00 - Air Duct Accessories

REFERENCE

Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

A single manufacturer shall select and furnish all isolation required, except packaged equipment with integral isolators meeting all the isolation and seismic requirements of this specification.

Isolator Stability and Rated Capacity:

Spring diameters not less than 0.8 of the compressed height of the spring at rated load.
Springs shall have a minimum additional travel to solid equal to 50 percent of the rated deflection.

Seismic Restraints:

Contractor is responsible for seismic design.

Restraint of equipment, piping and ductwork to be in accordance with the current state and local Building Code.

All calculations shall be in accordance with current state and local building code.

DESIGN CRITERIA

1 Isolate all motor driven mechanical equipment from the building structure and from the systems which
 2 they serve to prevent equipment vibrations from being transmitted to the structure. Consider equipment
 3 weight distribution to provide uniform isolator deflections.

4
 5 For equipment with variable speed capability, select vibration isolation devices based on the lowest
 6 speed.

7
 8 Provide flexible piping connections for all piping to rotating or reciprocating equipment mounted on
 9 vibration isolators except do not use flexible piping connectors on any type of gas piping or with inline
 10 pumps. Piping connected to a coil which is in an assembly mounted on vibration isolators is to have
 11 flexible piping connections and piping vibration hangers as specified below. Piping connected to a coil
 12 which is in an assembly where the fan is separately isolated by means of vibration isolators and duct
 13 flexible connections does not require flexible piping connectors or piping vibration hangers.

14
 15 Credit will be given for the inherent flexibility and vibration absorption characteristics of mechanical
 16 grooved pipe connections providing that supporting calculations are submitted for approval.

17
 18 Coordinate the selection of devices with the isolator and equipment manufacturers.

19
 20 **SUBMITTALS**

21 Submit the following:

22 Submit shop drawings showing complete details of construction for steel and concrete bases including:

23 Equipment mounting holes

24 Dimensions

25 Isolation selected for each support point

26 Details of mounting brackets for isolator

27 Weight distribution for each isolator

28 Code number assigned to each isolator

29
 30 Submit product data and calculation sheet for isolators, showing:

31 Size, type, load rating and rated deflection of each required isolator.

32 Percentage of vibration transmitted based on the lowest disturbing frequency of the equipment.

33
 34 **SHOP DRAWINGS**

35 Refer to division 1, General Conditions, Submittals.

36
 37 Include isolator type, materials of construction, isolator free and operating heights, and isolation efficiency
 38 based on the lowest operating speed of the equipment supported.

39
 40
 41
 42 **PART 2 - PRODUCTS**

43
 44 **MATERIALS**

45 Use materials that will retain their isolation characteristics for the life of the equipment served. Use
 46 industrial grade neoprene for elastomeric materials.

47
 48 Treat all isolators to resist corrosion. For isolation devices exposed to the weather or used in high
 49 humidity areas, hot dip galvanize steel parts, apply a neoprene coating on all steel parts, or use stainless
 50 steel parts; include limit stops to resist wind.

51
 52 Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.

53
 54 Use isolators with a ratio of lateral to vertical stiffness not less than 1.0 or greater than 2.0.

55
 56 **VIBRATION ISOLATOR MANUFACTURERS**

57 Mason Industries, Amber/Booth Co., Vibration Mounting & Controls, Peabody Noise Control, or approved
 58 equal.

59
 60 **TYPE 1: NEOPRENE PAD**

61 Neoprene waffle pad, 40 durometer with 16 gauge shims between layers.

62
 63 **TYPE 2: NEOPRENE PAD**

64 Double deflection neoprene mount having a minimum static deflection of 0.35 inches. Cover all metal
 65 surfaces with neoprene to resist corrosion. Include friction pads on both top and bottom surfaces so
 66 mounts need not be bolted to the floor but include bolt holes for those areas where bolting is required.

1 For equipment such as small vent sets and close coupled pumps, include steel rails for use between the
 2 isolator and the equipment to accommodate equipment overhang.

3
 4 **TYPE 3: UNHOUSED SPRING WITH NEOPRENE**

5 Combination freestanding, unhooused spring and neoprene with rib molded antifriction base. Include
 6 leveling bolts for securing to the equipment. Springs to be laterally stable under load and selected so
 7 they have an additional travel to solid equal to 50% of the rated deflection. Use height saving brackets
 8 when appropriate to the application.
 9

10 **TYPE 4: RESTRAINED SPRING WITH NEOPRENE**

11 Combination spring and neoprene with rib molded base similar to Type 3 mount above, but with a
 12 housing that includes seismic restraint. Maintain a minimum clearance of 1/2" around restraining bolts,
 13 and between the housing and the spring, so as not to interfere with the spring action. Design isolator so
 14 limit stops are out of contact during normal operation. Use height saving brackets when appropriate to
 15 the application.
 16

17 **TYPE 5: SPRING HANGER WITH NEOPRENE**

18 Vibration hanger with a steel spring and 0.3" deflection neoprene element in series. Use neoprene
 19 element molded with a rod isolation bushing that passes through the hanger box. Select spring diameters
 20 and size hanger box lower holes large enough to permit the hanger rod to swing through a 30 degree arc
 21 before contacting the hole and short circuiting the spring. Select springs so they have a minimum
 22 additional travel to solid equal to 50% of the rated deflection.
 23

24 **TYPE 6: PRECOMPRESSED SPRING HANGER WITH NEOPRENE**

25 Vibration hanger similar to Type 5 but precompressed to the rated deflection to keep the piping or
 26 equipment at a fixed elevation during installation. Design hanger with a release mechanism to free the
 27 spring after the installation is complete and the hanger is subjected to its full load.
 28

29 **TYPE 7: SPRING HANGER WITH NEOPRENE**

30 Steel spring hanger located in a neoprene cup manufactured with a grommet to prevent short circuiting of
 31 the hanger rod. Neoprene cup to contain a steel washer designed to properly distribute the load on the
 32 neoprene and prevent its extrusion. Design spring diameter and size hanger box lower hole sufficiently
 33 large to permit the hanger rod to swing through a 30° arc before contacting the hole perimeter and short
 34 circuiting the spring. Select spring so it has a minimum additional travel to solid equal to 50% of the rated
 35 deflection. Provide hanger with an eye bolt on the spring end and provision to attach the housing to the
 36 flat iron duct straps.
 37

38 **TYPE IB: INERTIA BASE**

39 Rectangular structural beam or channel concrete form for floating foundation. Include support for suction
 40 and discharge base ells for split case pump bases. Use perimeter steel members with a minimum depth
 41 equal to 1/12 of the longest dimension of the base but not less than 6"; base depth need not exceed 12"
 42 unless specifically recommended by the base manufacturer for mass or rigidity. Include concrete
 43 reinforcements consisting of steel angles or 1/2" bars welded in place on 6" centers running in two layers
 44 perpendicular to each other and 1-1/2" above the bottom; provide additional steel if required by the
 45 structural conditions. Furnish form with steel bolting templates and anchor bolt sleeves to receive
 46 equipment anchor bolts where anchor bolts fall in concrete locations. Use height saving brackets in all
 47 mounting locations to maintain a base clearance of at least 1" above the floor or housekeeping pad.
 48

49 **TYPE S: STEEL BASE**

50 Structural steel base, rectangular in shape for all equipment other than centrifugal refrigeration machines
 51 and pump bases which may be "T" or "L" shaped. Include support for suction and discharge base ells for
 52 split case pump bases. Use perimeter steel members with a minimum depth equal to 1/10 of the longest
 53 dimension of the base. Base depth need not exceed 14" provided that the deflection and misalignment is
 54 kept within acceptable limits as determined by the manufacturer. Use height saving brackets in all
 55 mounting locations to provide a base clearance of at least one inch above the floor or housekeeping pad.
 56

57 **TYPE T: HORIZONTAL THRUST RESTRAINT**

58 Spring element in series with a neoprene pad as described for Type 3 mount with the same deflection as
 59 specified for the mounting or hanger. Design the assembly so the spring element is contained within a
 60 steel frame, so it can be preset for thrust at the factory, and adjusted in the field for a maximum of 1/4"
 61 movement at start and stop. Include threaded rod and angle brackets for attachment to both equipment
 62 and ductwork or equipment and structure.
 63

64 **FLEXIBLE PIPING CONNECTIONS**

65 Flexible stainless steel hoses shall be manufactured using type 304 stainless steel hose and braid with
 66 one fixed and one floating raised face carbon steel plate flange.

1 Sizes 2-1/2-inch (65mm) and smaller may have threaded male nipples or copper sweat ends. Grooved
 2 ends are acceptable in all sizes in grooved piping systems. Weld ends are not acceptable. Copper
 3 sweat end hoses for water service shall be all copper or bronze construction.
 4 Hose shall have close pitch annular corrugations for maximum flexibility and low stiffness. Tested hose
 5 stiffness at various pressures must be included in the submittals.
 6 Hose shall be capable of continuous operation at 150 psi and system test pressure when installed in
 7 piping systems.
 8 Hose shall be the same size as the pipe it connects and have pipe thread connectors on both ends with
 9 male or female end adapters as required.
 10 Mason type BSS, FFL, MN, CPS or CPSB, similar HCl, Metraflex.

11 **PERFORMANCE**

12 Select vibration isolation devices as indicated below or to provide not less than 95% isolation efficiency,
 13 whichever is greater.

TYPE OF EQUIPMENT	----- Floor Span or Column Spacing-----							
	--On Grade--		---20 Feet---		---30 Feet---		---40 Feet---	
	Iso. Type	Min. Static Defl. In.	Iso. Type	Min. Static Defl. In.	Iso. Type	Min. Static Defl. In.	Iso. Type	Min. Static Defl. In.
25 CABINET FANS 26 AND FAN SECTIONS 27 OF AIR HANDLING UNITS: 28 Suspended								Type 5-T supports with deflection from blower minimum deflection guide. Type T needed only when air thrust exceeds 10% of equipment weight.
32 Floor mounted								Type 2-T for 0.35" deflection, type 3-T for 0.75" deflections and type 3-S-T for deflections over 0.75" with deflection from blower minimum deflection guide.
36 PIPING CONNECTED TO 37 ROTATING OR 38 RECIPROCATING 39 EQUIPMENT:								Flexible piping connections, and type 5 or 6 hangers for a distance of 100 pipe diameters or a distance of three hangers away from the equipment, whichever is greater. Type 6 hangers shall be utilized for the first two upstream and downstream hangers. The Type 5 and/or type 6 hangers must have the same deflection as the hangers supporting the rotating or reciprocating equipment. Where piping is floor supported, the above requirement apply, but use type 3 mounts instead of type 5 or 6 hangers.
48 DUCTWORK IN 49 MECHANICAL EQUIPMENT 50 ROOMS:								Use type 7 hanger with .75" minimum deflection for all ducts with a cross sectional area greater than 2.0 square feet and, where either the air velocity is great than 3500 fpm or, the pressure class is 4" water column or higher.

58 **BLOWER MINIMUM DEFLECTION GUIDE**

Fan Speed (RPM)	-----Required Deflection (Inches)-----			
	On Grade	20' Floor Span	30' Floor Span	40' Floor Span
65 175-224	0.35	3.50	4.50	4.50
66 225-299	0.35	3.50	3.50	3.50

1	300-374	0.35	2.50	2.50	3.50
2	375-499	0.35	1.50	2.50	3.50
3	500 and over	0.35	0.75	1.50	2.50

SEISMIC RESTRAINTS

General Requirements:

Seismic restraints shall be provided for all equipment, piping and ductwork, both supported and suspended.

Bracing of piping and ductwork shall be in accordance with the code and with the provisions set forth in the SMACNA seismic restraint manual.

The structural requirements for the restraints, including their attachment to the building structure, shall be reviewed and approved by the structural engineer.

Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.

Supported Equipment:

All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene.

Bushing shall be replaceable and a minimum of 1/4-inch thick. Rated loadings shall not exceed 1000 psi. An air gap of 1/4-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. Neoprene bushings shall be rotated to ensure no short circuits exist before systems are activated.

Snubber shall be type Z-1225 as manufactured by Mason Industries, Inc.

Bracing of Ductwork:

Brace rectangular ducts with cross sectional areas of 6 square feet and larger. Brace flat oval ducts in the same manner as rectangular ducts. Brace round ducts with diameters of 28-inches and larger. Brace flat oval ducts the same as rectangular ducts of the same nominal size.

Exception: No bracing is required if the duct is suspended by hangers 12-inches or less in length, as measured from the top of the duct to the bottom of the support where the hanger is attached, and the $l_p=1.0$.

Transverse bracing shall occur at the interval specified in the SMACNA tables or at both ends if the duct run is less than the specified interval. Transverse bracing shall be installed at each duct turn and at each end of a duct run, with a minimum of one brace at each end.

Longitudinal bracing shall occur at the interval specified in the SMACNA tables with at least one brace per duct run. Transverse bracing for one duct section may also act as longitudinal bracing for a duct section connected perpendicular to it if the bracing is installed within four feet of the intersection of the ducts and if the bracing is sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.

Install duct flex connections at equipment connections to accept expected differential displacement and protect the equipment connection from damage.

Suspended Equipment and Piping and Ductwork:

Seismic cable restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint.

Cable must be pre-stretched to achieve a certified minimum modulus of elasticity. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement.

Cable assemblies shall be type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod and the clevis or SCBV if clamped to a beam, all as manufactured by Mason Industries, Inc.

Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies shall be type SRC or UC as manufactured by Mason Industries, Inc.

Pipe clevis cross-bolt braces are required in all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross brace shall be type CCB as manufactured by Mason Industries, Inc.

PART 3 - EXECUTION

INSTALLATION

Install vibration isolation devices for motor driven equipment in accordance with the manufacturer's installation instructions.

Set steel and inertia bases for one inch clearance between the concrete floor or housekeeping pad and the base.

1 Do not allow installation practices to short circuit any isolation device.

2
3 Install flexible piping connections on the equipment side of shut-off valves.

4
5 **PACKAGED AIR HANDLING UNITS, CUSTOM AIR HANDLING UNITS AND CENTRIFUGAL FANS**

6 Attach horizontal thrust restraints at the centerline of thrust and symmetrically on either side of the unit.
7 Thrust restraints are not required when the fan section is not isolated from the remainder of the air
8 handling unit by means of duct flexible connections.

9
10 **SEISMIC RESTRAINTS**

11 **General**

12 Install and adjust seismic restraints so that the equipment, piping, and ductwork support is not degraded
13 by the restraints.

14 Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.

15
16 **Supported Equipment**

17 Each vibration isolation frame for supported equipment shall have a minimum of four seismic snubbers
18 mounted as close as possible to the vibration isolators and/or the frame extremities.

19 Care must be taken so that the 1/4-inch air gap in the seismic restraint snubber is preserved on all sides
20 in order that the vibration isolation potential of the isolator is not compromised. This requires that the final
21 snubber adjustment be completed after the vibration isolators are properly installed and the installation
22 approved.

23
24 **Bracing of Ductwork:**

25 Hanger straps must be positively attached to the duct within 2-inches of the top of the duct with a
26 minimum of two #10 sheet metal screws.

27 A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the
28 ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details
29 are selected.

30 Walls, including gypsum board nonbearing partitions, which have ducts running through them, may
31 replace a typical transverse brace. Provide solid blocking around duct penetrations at stud wall
32 construction.

33 Unbraced ducts shall be installed with a 6-inch minimum clearance to vertical ceiling hanger wires.

34
35 **Suspended Equipment, Piping, and Ductwork Cable Method:**

36 The cables shall be adjusted to a degree of slackness approved by the Structural Engineer.

37 The uplift and downward restraint nuts for Mason type RW neoprene covered steel rebound washers
38 shall be adjusted so that there is a maximum 1/4-inch clearance.

39
40 **END OF SECTION**

PART 1 - GENERAL

SCOPE

This section includes air and water testing, adjusting and balancing for the entire project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Description
- Pre-Installation Meeting and Scheduling
- Pre-Balance Conference
- Submittals

PART 2 - PRODUCTS

- Instrumentation

PART 3 - EXECUTION

- Preliminary Procedures
- Existing Equipment
- Performing Testing, Adjusting and Balancing
- Deficiencies

RELATED WORK

- Section 01 91 01 or 01 91 02 – Commissioning Process
- Section 23 05 00 Common Work Results for HVAC
- Section 23 05 48 Vibration and Seismic Controls for HVAC Piping and Equipment
- Section 23 07 00 HVAC Insulation
- Section 23 08 00 – Commissioning of HVAC
- Section 23 09 23 Direct Digital Control System for HVAC

REFERENCE

Applicable provisions of the General Conditions, Supplementary General Conditions and General Requirements in Division 1 govern work under this section.

REFERENCE STANDARDS

- AABC National Standards for Total System Balance, Sixth Edition, 2002.
- ASHRAE ASHRAE Handbook, 2007 HVAC Applications, Chapter 37, Testing Adjusting and Balancing.
- NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems, Seventh Edition, 2005.
- TABB Tab Procedural Guide, First Edition, 2003.

DESCRIPTION

The Contractor will separately contract with an independent test and balance agency to perform all testing, adjusting, and balancing of air systems required for this project. Work related to the testing, adjusting, and balancing that must be performed by the installing mechanical contractor is specified in other section of these specifications.

Provide total mechanical systems testing, adjusting and balancing. Requirements include the balance of air and water distribution, adjustment of new and existing systems and equipment to provide design requirements indicated on the drawings, electrical measurement and verification of performance of all mechanical equipment, all in accordance with standards published by AABC, NEBB, or TABB.

Test, adjust and balance all air systems so that each room, piece of equipment or terminal device meets the design requirements indicated on the drawings and in the specifications.

Accomplish testing, adjusting and balancing work in a timely manner that allows partial occupancy of major buildings, occupancy of one building when the project involves many buildings, and completion of the entire project in the time stated in the Instruction to Bidders and in accordance with the completion schedule established for this project.

Verify that provisions are being made to accomplish the specified testing, adjusting and balancing work. If problems are found, handle as specified in Part 3 under Deficiencies.

QUALITY ASSURANCE

Qualifications

An independent Firm specializing in the Testing and Balancing of HVAC systems for a minimum of 3 years. A Firm not engaged in the commerce of furnishing or providing equipment or material generally related to HVAC work other than that specifically related to installing Testing and Balancing components necessary for work in this section such as, but not limited to sheaves, pulleys, and balancing dampers.

A certified member of AABC or certified by NEBB or TABB in the specific area of work performed. Maintain certification for the entire duration of the project. If certification of firm or any staff performing work is terminated or expires during the duration of the project, contact Owners Representative immediately.

Technicians on this project must have satisfactorily completed work on a minimum of (3) three projects of at least 50% in size, and of similar complexity. Size is defined as the quantity of each specific individual item requiring testing and balancing such as, but not limited to, equipment, devices, terminal devices, and grilles and diffusers.

Submit Qualifications of firm and project staff to Owner upon requested.

PRE-INSTALLATION MEETING AND SCHEDULING

The test and balance agency is required to attend a pre-installation meeting with all other project contractors before the construction process is started. The test and balance agency shall give the Mechanical Contractor a detailed schedule of testing and balancing tasks for incorporation into the project schedule.

PRE-BALANCE CONFERENCE

90 days prior to beginning testing, adjusting and balancing, schedule and conduct a conference with the Architect/Engineer, Commissioning Provider (CxP), Owner's Project Representative and the EMCS installing Contractors. Provide AE and Commissioning Provider (CxP) with a complete copy of the TAB plan for the project. The objective is final coordination and verification of system operation and readiness for testing, adjusting and balancing procedures and scheduling procedures with the above mentioned parties. Indicate work required to be completed prior to testing, adjusting, and balancing and identify the party responsible for completion of that work.

SUBMITTALS

See also Related Work in this section.

Submit testing, adjusting and balancing reports bearing the seal and signature of the NEBB, AABC or TABB Certified Test and Balance Supervisor. The reports certify that the systems have been tested, adjusted and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed and are operating; and are an accurate record of all final quantities measured to establish normal operating values of the systems.

Submission:

Distribute electronic copies of the Report to the Contractor, the Project Coordinator, Owner, and the Prime A/E,

Enter a RFI, requesting review of the report.

Format: Cover page identifying project name, project number and descriptive title of contents. Divide the contents of the report into the below listed divisions:

- General Information
- Summary
- Air Systems
- Hydronic Systems
- Special Systems

Contents: Provide the following minimum information, forms and data:

General Information: Inside cover sheet identifying Test and Balance Agency, Contractor, Architect, Engineer, Project Name and Project Number. Include addresses, contact names and telephone numbers. Also include a certification sheet containing the seal and signature of the Test and Balance Supervisor.

1 Summary: Provide summary sheet describing mechanical system deficiencies. Describe objectionable
2 noise or drafts found during testing, adjusting and balancing. Provide recommendations for correcting
3 unsatisfactory performances and indicate whether modifications required are within the scope of the
4 contract, are design related or installation related. List instrumentation used during testing, adjusting and
5 balancing procedures.

6
7 The remainder of the report to contain the appropriate standard NEBB, AABC, or TABB forms for each
8 respective item and system. Fill out forms completely. Where information cannot be obtained or is not
9 applicable indicate same.

10 11 12 **PART 2 - PRODUCTS**

13 **INSTRUMENTATION**

14 Provide all required instrumentation to obtain proper measurements. Application of instruments and
15 accuracy of instruments and measurements to be in accordance with the requirements of NEBB, AABC,
16 or TABB Standards and instrument manufacturer's specifications.

17
18 All instruments used for measurements shall be accurate, and calibration histories for each instrument to
19 be available for examination by DD upon request. Calibration and maintenance of all instruments to be in
20 accordance with the requirements of NEBB, AABC, or TABB Standards

21 22 23 24 **PART 3 - EXECUTION**

25 **DAILY REPORTS**

26 Submit to Owner's Project Representative daily work activity reports for each day on which testing and
27 balancing work is performed. Reports shall include description of day's activities and description of any
28 system deficiencies.

29 **PRELIMINARY PROCEDURES**

30 Review preconstruction meeting report, applicable construction bulletins, applicable change orders and
31 approved shop drawings of equipment, outlets/inlets and temperature controls.

32 Check filters for cleanliness, dampers and valves for correct positioning, equipment for proper rotation
33 and belt tension, temperature controls for completion of installation and hydronic systems for proper
34 charge and purging of air.

35 Notify Owner's Project Representative on a daily basis during balancing. Identify deficiencies preventing
36 completion of testing, adjusting and balancing procedures. Do not proceed until systems are fully
37 operational with all components necessary for complete testing, adjusting and balancing. Installing
38 Contractors are required to provide personnel to check and verify system completion, readiness for
39 balancing and assist Balancing Agency in providing specified system performance.

40 **EXISTING EQUIPMENT**

41 **PERFORMING TESTING, ADJUSTING AND BALANCING**

42 Perform testing, adjusting and balancing procedures on each system identified, in accordance with the
43 detailed procedures outlined in the referenced standards except as may be modified below.

44 Unless specifically instructed in writing, all work in this specification section is to be performed during the
45 normal workday.

46 In areas containing ceilings, remove ceiling tile to accomplish balancing work; replace tile when work is
47 complete and provide new tile for any tile that are damaged by this procedure. If the ceiling construction
48 is such that access panels are required for the work of this section and the panels have not been
49 provided, inform the owner's project representative.

50 Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary for
51 adequate performance of procedures. Patch using materials identical to those removed, maintaining
52 vapor barrier integrity and pressure rating of systems.

53 In air systems employing filters, blank off sufficient filter area to simulate a pressure drop that is midway
54 between that of a clean filter and that of a dirty filter.

1 Measure and record system measurements at the fan and/or pump to determine total flow. Adjust
 2 equipment as required to yield specified total flow at terminals. Proceed taking measurements in mains
 3 and branches as required for final terminal balancing. Perform terminal balancing to specified flows
 4 balancing branch dampers, deflectors, extractors and valves prior to adjustment of terminals.
 5

6 Measure and record static air pressure conditions across fans, coils and filters. Indicate in report if
 7 cooling coil measurements were made on a wet or dry coil and if filter measurements were made on a
 8 clean or dirty filter. Spot check static air pressure conditions directly ahead of terminal units.
 9

10 Adjust outside air, return air and relief air dampers for design conditions at both the minimum and
 11 maximum settings and record both sets of data. Balance modulating dampers at extreme conditions and
 12 record both sets of data. Balance variable air volume systems at maximum air flow rate, full cooling, and
 13 minimum flow rate, full heating; record all data.
 14

15 Adjust register, grille and diffuser vanes and accessories to achieve proper air distribution patterns and
 16 uniform space temperatures free from objectionable noise and drafts within the capabilities of the installed
 17 system.
 18

19 Provide fan and motor drive sheave adjustments necessary to obtain design performance. Provide drive
 20 changes specifically noted on drawings, if any. If work of this section indicates that any drive or motor is
 21 inadequate for the application, advise the owner's project representative by giving the representative
 22 properly sized motor/drive information (in accordance with manufacturers original service factor and
 23 installed motor horsepower requirements); Confirm any change will keep the duct/piping system within its
 24 design limitations with respect to speed of the device and pressure classification of the distribution
 25 system. Required motor/drive changes not specifically noted on drawings or in specifications will be
 26 considered an extra cost and will require an itemized cost breakdown submitted to owner's project
 27 representative. Prior authorization is needed before this work is started.
 28

29 Areas or rooms designed to maintain positive, negative or balanced air pressures with respect to adjacent
 30 spaces, as indicated by the design air quantities, require special attention. Adjust fan drives, distribution
 31 dampers, terminals and controls to maintain indicated pressure relationship.
 32

33 Final air system measurements to be within the following range of specified cfm:

34	Fans	0% to +10%
35	Supply grilles, registers, diffusers	0% to +10%
36	Return/exhaust grilles, registers	0% to -10%
37	Room pressurization air	-5% to +5%

38
 39 Contact the General Contractor for assistance in operation and adjustment of controls during testing,
 40 adjusting and balancing procedures. Cycle controls and verify proper operation and setpoints. Include in
 41 report description of temperature control operation and any deficiencies found.
 42

43 Permanently mark equipment settings, including damper and valve positions, control settings, and similar
 44 devices allowing settings to be restored. Set and lock memory stops.
 45

46 Leave systems in proper working order, replacing belt guards, closing access doors and electrical boxes,
 47 and restoring temperature controls to normal operating settings.
 48

49 Coordinate and assist Cx Personnel with all verification activities defined within section (01 91 01, 02)
 50 including providing all required sampling data necessary for the commissioning process.
 51

DEFICIENCIES

52 Division 23 00 00 contractor to correct any installation deficiencies found by the test and balance agency
 53 that were specified and/or shown on the Contract Documents to be performed as part of that division of
 54 work. Test and balance agency will notify the Engineer and Owner's Representative of these items and
 55 instructions will be issued to the Division 23 00 00 contractor for correction of the deficient work. All
 56 corrective work to be done at no cost to the owner. Retest mechanical systems, equipment, and devices
 57 once corrective work is complete as specified.
 58
 59
 60

61 END OF SECTION
 62
 63

PART 1 - GENERAL**SCOPE**

This section includes insulation specifications for heating, ventilating and air conditioning piping, ductwork and equipment. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Description
- Definitions
- Shop Drawings
- Operation and Maintenance Data
- Environmental Requirements

PART 2 - PRODUCTS

- Materials
- Insulation Types
- Adhesives, Mastics, Sealants, and Reinforcing Materials Jackets
- Insulation Inserts and Pipe Shields
- Expansion Joint and Valve Insulation Blankets
- Accessories

PART 3 - EXECUTION

- Examination
- Installation
- Protective Jacket Installation
- Piping, Valve and Fitting Insulation
- Piping Protective Jackets
- Removable Insulation Blankets
- Pipe Insulation Schedule
- Duct Insulation
- Ductwork Protective Coverings
- Duct Insulation Schedule
- Equipment Insulation
- Equipment Insulation Schedule
- Construction Verification Items

RELATED WORK

- Section 01 91 01 or 01 91 02 – Commissioning Process
- Section 23 05 00 - Common Work Results for HVAC
- Section 23 08 00 – Commissioning of HVAC
- Section 23 11 00 - Facility Fuel Piping
- Section 23 21 13 - Hydronic Piping
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 31 00 - HVAC Ducts and Casings

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ASTM B209 Aluminum and Aluminum Alloy Sheet and Plate
- ASTM C165 Test Method for Compressive Properties of Thermal Insulations
- ASTM C177 Heat Flux and Thermal Transmission Properties
- ASTM C195 Mineral Fiber Thermal Insulation Cement
- ASTM C240 Cellular Glass Insulation Block
- ASTM C302 Density of Preformed Pipe Insulation
- ASTM C272 Water Absorption of Core Materials for Sandwich Constructions
- ASTM C303 Density of Preformed Block Insulation
- ASTM C355 Test Methods for Test for Water Vapor Transmission of Thick Materials
- ASTM C449 Mineral Fiber Hydraulic Setting Thermal Insulation Cement
- ASTM C518 Heat Flux and Thermal Transmission Properties
- ASTM C533 Calcium Silicate Block and Pipe Thermal Insulation
- ASTM C534 Preformed Flexible Elastomeric Thermal Insulation
- ASTM C547 Mineral Fiber Preformed Pipe Insulation
- ASTM C552 Cellular Glass Block and Pipe Thermal Insulation
- ASTM C553 Mineral Fiber Blanket and Felt Insulation
- ASTM C578 Preformed, Block Type Cellular Polystyrene Thermal Insulation

1	ASTM C591	Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
2	ASTM C610	Expanded Perlite Block and Thermal Pipe Insulation
3	ASTM C612	Mineral Fiber Block and Board Thermal Insulation
4	ASTM C921	Properties of Jacketing Materials for Thermal Insulation
5	ASTM C1136	Flexible Low Permeance Vapor Retarders for Thermal Insulation
6	ASTM C1728	Standard for Aerogel Insulation
7	ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
8	ASTM D1000	Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and
9		Electronic Applications
10	ASTM D1621	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
11	ASTM D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
12	ASTM D1940	Method of Test for Porosity of Rigid Cellular Plastics
13	ASTM D2126	Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
14	ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness
15	ASTM D5590	Test Method for Determining the Resistance of Coatings to Fungal Defacement
16	ASTM E84	Surface Burning Characteristics of Building Materials
17	ASTM E814	Standard Test Method for Fire Tests of Penetration Firestop Systems
18	ASTM E2336	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
19	MICA	National Commercial & Industrial Insulation Standards
20	NFPA 225	Surface Burning Characteristics of Building Materials
21	UL 723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions

Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.

Insulation systems shall be applied by experienced contractors. Within the past five (5) years, the contractor shall be able to document the successful completion of a minimum of three (3) projects of at least 50% of the size and similar scope of the work specified in this section.

Regulatory Requirements:

All insulating products shall comply with the Oregon Revised Statute (ORS) 453.005(7)(e) prohibiting pentabrominated, octabrominated and decabrominated diphenyl ethers. Where products within this specification contain these banned substances, provide complying products from approved manufacturers with equal performance characteristics.

Flame and Smoke Ratings: Installed composite flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by UL 723.

Energy Codes: Local Building and Energy Codes shall govern where insulation performance requirements for thickness exceeds thickness specified.

Protection:

Protect against dirt, water, chemical, or mechanical damage before, during, and after installation. Repair or replace damaged insulation at no additional cost.

Source Quality Control:

Service: Use insulation specifically manufactured for service specified.

Labeling: Insulation labeled or stamped with brand name and number.

Insulation and accessories shall not provide any nutritional or bodily use to fungi, bacteria, insects, rats, mice, or other vermin, shall not react corrosively with equipment, piping, or ductwork, and shall be asbestos free.

DESCRIPTION

Furnish and install all insulating materials and accessories as specified or as required for a complete installation. The following types of insulation are specified in this section:

- Duct Insulation

Install all insulation in accordance with accepted industry best practice.

DEFINITIONS

Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. All other areas, including walk-through tunnels, shall be considered as exposed.

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

1 Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening
2 methods, fitting materials along with material safety data sheets and intended use of each material.
3 Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and
4 manufacturer's installation instructions.
5

6 **OPERATION AND MAINTENANCE DATA**

7 All operations and maintenance data shall comply with the submission and content requirements
8 specified under section GENERAL REQUIREMENTS.
9

10 **ENVIRONMENTAL REQUIREMENTS**

11 Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install
12 insulation products that have been exposed to water.
13

14 Protect installed insulation work with plastic sheeting to prevent water damage.
15

16 **PART 2 - PRODUCTS**

17 **MATERIALS**

18 Manufacturers: Armacell, CertainTeed, Manson, Childers, Dow, Extol, Fibrex, Halstead, Foster, Imcoa,
19 Johns Manville, Knauf, Owens-Corning, , Pittsburgh Corning, , VentureTape or approved equal.
20

21 Materials or accessories containing asbestos will not be accepted.
22

23 Use composite insulation systems (insulation, jackets, sealants, mastics, and adhesives) that have a
24 flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:
25

26 Pipe insulation which is not located in an air plenum may have a flame spread rating not over 25 and a
27 smoke developed rating no higher than 450 when tested in accordance with UL 723 and ASTM E84.
28

29 **INSULATION TYPES**

30 Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation
31 shall be suitable to receive jackets, adhesives and coatings as indicated.
32

33 **FLEXIBLE FIBERGLASS INSULATION:**

34 Minimum nominal density of 0.75 lbs. per cu. ft., and thermal conductivity of not more than 0.30 at 75
35 degrees F, rated for service to 250 degrees F.
36

37 **RIGID FIBERGLASS INSULATION:**

38 Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity of not more than 0.23 at 75
39 degrees F, 0.25 at 125 degrees F, 0.27 at 150 degrees F, 0.29 at 200 degrees F, 0.32 at 250 degrees F,
40 minimum compressive strength of 25 PSF at 10% deformation, rated for service to 450 degrees F.
41

42 **SEMI-RIGID FIBERGLASS INSULATION:**

43 Minimum nominal density of 3 lbs. per cu. ft., thermal conductivity of not more than 0.28 at 75 degrees F,
44 minimum compressive strength of 125 PSF at 10% deformation, rated for service to 450 degrees F.
45 Insulation fibers perpendicular to jacket and scored for wrapping cylindrical surfaces.
46

47 **ELASTOMERIC INSULATION:**

48 Flexible closed cell, minimum nominal density of 5.5 lbs. per cu. ft., thermal conductivity of not more than
49 0.27 at 75 degrees F, minimum compressive strength of 4.5 psi at 25% deformation, maximum water
50 vapor permeability of 0.17 perm inch, maximum water absorption of 6% by weight, rated for service
51 range of -20 degrees F to 220 degrees F on piping and 180 degrees F where adhered to equipment.
52

53 **POLYISOCYANURATE INSULATION:**

54 Rigid closed cell polyisocyanurate, minimum nominal density of 2.0 lbs. per cu. ft., thermal conductivity of
55 not more than 0.19 at 75 degrees F aged 180 days, minimum compressive strength of 24 psi parallel and
56 13 psi perpendicular, maximum water vapor permeability of 4 perm inch, maximum water absorption of
57 2% by volume, rated for service range of -290 degrees F to 300 degrees F.
58

59 **MINERAL WOOL INSULATION:**

60 Rigid preformed mineral wool, minimum nominal density of 8 lbs. per cu. ft., thermal conductivity at mean
61 temperature of not more than 0.25 at 125 degrees F, 0.27 at 150 degrees F, 0.29 at 200 degrees F, 0.32
62 at 250 degrees F, minimum compressive strength of 3 psi, maximum wicking of 1%, maximum water
63 adsorption of 1% by volume, rated for service of -120 degrees F to 1200 degrees F.
64

65 Pipe insulation shall be performed in two (2) half cylinder sections. Cut V-groove sheet insulation is not
66 acceptable. Provide three (3) stainless steel bands for each section of insulation.
67
68

FIREPROOFING INSULATION:

Mineral wool with nominal density of 8 lbs. per cu. ft., flame spread index of 25, fuel contribution index of 0, and smoke developed index of 0, thermal conductivity of not more than 0.23 at 75 degrees F, rated for service of -120 degrees F to 1200 degrees F. Use rigid or semi-rigid board for duct insulations.

Foil-scrim-polyethylene vapor retarding jacket, factory applied to insulation, maximum permeance of .02 perms.

ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

Products shall be compatible with surfaces and materials on which they are applied, and shall be suitable for use at operating temperatures of systems to which they are applied.

FIBERGLASS INSULATION ADHESIVE:

Must comply with ASTM C916, Type II: Foster 85-60, Childers CP-127, Duro Dyne SSG.

VAPOR RETARDING MASTIC:

Below ambient equipment/piping, mastic must be anti-fungal and shall meet ASTM D 5590 with 0 growth rating (AF), water vapor permeance shall be less than 0.013 perms at 43 mils dry film thickness per ASTM E 96 Procedure B: Foster 30-80AF Vapor Safe Mastic or equal.

LAGGING ADHESIVE / COATINGS:

For all indoor applications, coating must be anti-fungal and shall meet ASTM D 5590 with 0 growth rating (AF): Foster 30-36 AF Seal Fas, Childers CP-137 AF Chil-Seal.

REINFORCING MESH:

Foster 42-24 Mast A Fab, Childers Chil Glas #10 or Pittsburgh Corning PC 79.

METAL JACKETING SEALANT FOR ALL ALUMINUM JACKETING:

Foster 95-44 Elastolar, Childers CP-76 Chil-Byl, Pittsburgh Corning 727.

INSULATION JOINT SEALANT: (cellular glass, polyisocyanurate, phenolic)

Used on all below ambient piping to prevent moisture ingress. Foster 95-50 Flextra, Childers CP-76 Chil-Byl, Pittsburgh Corning CW Sealant.

JACKETS

ALL SERVICE JACKETS (ASJ):

Heavy duty, fire retardant material with white kraft reinforced foil vapor retarding jacket, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

FOIL SCRIM ALL SERVICE JACKETS (FSJ):

Glass fiber reinforced foil kraft laminate, factory applied to insulation. Maximum permeance of .02 perms and minimum beach puncture resistance of 25 units.

Vapor retarding tape shall be specifically designed and manufactured for use with the self-adhering jacket specified above. Tape shall be provided by the same manufacturer that provides jacketing. Vapor retarding tapes used with self-adhering jackets shall have a maximum permeance of 0.0 perms.

FABRIC REINFORCED MASTIC JACKETS (FMJ):

Glass fiber reinforcing fabric imbedded in weather barrier mastic as per manufacturer's recommended procedure for 2 coat application.

VAPOR RETARDING JACKETS (VRJ):

Polyvinylidene chloride (PVDC) vapor retarding jacket material with minimum 6 mils material thickness and maximum permeance of 0.01 perms. Material shall not support the growth of mold or mildew. Dow Saran or equivalent.

Vapor retarding tape shall be specifically designed and manufactured for use with the vapor retarding jacket specified above. Tape shall be provided by the same manufacturer that provides jacketing. Vapor retarding tapes used with vapor retarding jackets shall have a maximum permeance of 0.01 perms.

ACCESSORIES

All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.

Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.

- 1
- 2 Insulation bands to be 3/4 inch wide, constructed of aluminum or stainless steel. Minimum thickness to
- 3 be 0.015 inch for aluminum and 0.010 inch for stainless steel.
- 4
- 5 Tack fasteners to be stainless steel ring grooved shank tacks.
- 6
- 7 Staples to be clinch style.
- 8
- 9 Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.
- 10
- 11 Finishing cement to be ASTM C449.
- 12
- 13 Fibrous glass or canvas fabric reinforcing used with lagging adhesive shall have a minimum untreated
- 14 weight of 6 oz./sq. yd.
- 15
- 16 Joint sealants and metal jacketing sealants to be non-shrinking and permanently flexible.
- 17
- 18 Vapor retarding coatings to have maximum applied water vapor permeance of 0.03 perms or less at 45
- 19 ,ils dry as tested by ASTM E96.
- 20
- 21 Fungicidal water base duct liner coating (Foster 40-20 or equal) to be compatible with vapor retarding
- 22 coating. This product must be EPA registered to be used inside HVAC ducts. Coating must comply with
- 23 ASTM D 5590 with 0 growth rating.
- 24
- 25

PART 3 - EXECUTION

EXAMINATION

- 26
- 27
- 28
- 29 Verify that all piping, equipment, and ductwork are tested and approved prior to installing insulation. Do
- 30 not insulate systems until testing and inspection procedures are completed.
- 31
- 32 Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.
- 33

INSTALLATION

- 34
- 35 All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be
- 36 installed in strict accordance with manufacturer's recommendations, building codes, and industry
- 37 standards. Do not install products when the ambient temperature or conditions are not consistent with the
- 38 manufacturer's recommendations. Surfaces to be insulated must be clean and dry.
- 39
- 40 Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in
- 41 such a manner as to protect all raw edges, ends and surfaces of insulation.
- 42
- 43 Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be
- 44 accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at
- 45 other locations where insulation terminates.
- 46
- 47 Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.
- 48
- 49 Use full length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation
- 50 or pieces cut undersize and stretched to fit will not be accepted.
- 51
- 52 All pipe and duct insulation shall be continuous through walls, ceiling or floor openings and through
- 53 sleeves except where firestop or firesafing materials are required. Vapor retarding jacket shall be
- 54 maintained continuous through all penetrations.
- 55
- 56 Provide a continuous unbroken moisture vapor retarding jacket on insulation applied to systems noted
- 57 below. Attachments to cold surfaces shall be insulated and vapor sealed to prevent condensation.
- 58
- 59 Provide a complete vapor retarding jacket for insulation on the following systems:
- 60
 - Refrigerant
 - 61 • Insulated Duct
 - 62 • Equipment, ductwork or piping with a surface temperature below 65 degrees F
- 63

PROTECTIVE JACKET INSTALLATION

- 64
- 65 ALL SERVICE JACKETS (ASJ) and FOIL SCRIM ALL SERVICE JACKETS (FSJ):
- 66 Install according to manufacturer's recommendations using factory supplied lap seals and butt strip
- 67 seals.

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FABRIC REINFORCED MASTIC JACKETS (FMJ):
Glass fiber fabric shall be fitted without wrinkles. Glass fiber fabric shall be sized immediately upon application with lagging adhesive and shall be capable of drying within 6 hrs. Apply adhesive and coating in accordance with manufacturer’s recommendations. All seams shall overlap not less than 2”.

VAPOR RETARDING JACKETS (VRJ):
Piping with vapor retarding jackets (VRJ) shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. Piping with a PVC jacket (PFJ) installed over the vapor retarding jackets (VRJ) may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

REMOVABLE INSULATION BLANKETS: (EXPANSION SLIP JOINT AND VALVES 2-1/2” AND LARGER)

Provide removable reusable insulated cover on all new and existing expansion slip joints, ball joints and valves.

Install blankets to be field removable without tools.

Blankets shall be installed to allow the normal expansion and contraction associated with these systems, without crushing or damaging the blanket.

Expansion Joint blankets shall extend over the adjacent rigid insulation to allow for pipe expansion.

Blankets shall be installed without sagging or gaps.

Blankets shall be installed to shed water.

Steam system will not be allowed to turn on until removable jackets are installed.

DUCT INSULATION

GENERAL:

Secure flexible duct insulation on sides and bottom of ductwork over 24" wide and all rigid duct insulation with weld pins. Space fasteners 18" on center or less as required to prevent sagging.

Secure rigid board insulation to ductwork with weld pins. Apply insulation with joints firmly butted as close as possible to the equipment surface. Pins shall be located a maximum of 3" from each edge and spaced no greater than 12" on center.

Install weld pins without damage to the interior galvanized surface of the duct. Clip pins back to washer and cover penetrations with tape of same material as jacket. Firmly butt seams and joints and cover with 4" tape of same material as jacket. Seal tape with plastic applicator and secure with staples. All joints, seams, edges and penetrations to be fully vapor sealed with vapor retarding mastic.

Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation or jacket material.

External supply duct insulation is not required where ductwork contains continuous 1" acoustical liner. Provide 4" overlap of external insulation over ends of acoustically lined sections.

Where insulated ductwork is supported by trapeze hangers, the insulation shall be installed continuous through the hangers. Drop the supporting channels required to facilitate the installation of the insulation. Where rigid board or flexible insulation is specified, install high density inserts to prevent the weight of the ductwork from crushing the insulation.

Where insulated low temperature (below 45°F) ductwork is supported by steel metal straps or wire ropes that are secured directly to the duct, the straps or ropes shall be completely covered with insulation and sealed to provide a complete vapor retarding barrier.

Where insulated duct risers are supported by steel channels secured directly to the duct, extend the insulation and vapor retarding jacketing to encapsulate the support channels.

Where ductwork exposed to the weather is insulated with any product other than fluid-applied ductwork insulation, the top surface of the insulation shall be sloped a minimum of ¼" per foot to eliminate ponding and create positive drainage off of insulation. Refer to fluid-applied ductwork insulation section below for slope requirements.

DUCTWORK PROTECTIVE COVERINGS:

In addition to the jackets specified in the duct insulation schedule below the following protective coverings are required:

Provide a protective covering of 2 coats of indoor/outdoor vapor retarding mastic with fibrous glass or canvas fabric covering (FMJ) for the following ductwork:

- Ductwork within 6' of floor, catwalks and mezzanines in mechanical rooms

Provide a protective self-adhering jacket (SAJ) for the following insulated ductwork:

DUCT INSULATION SCHEDULE:

Provide duct insulation on new and existing remodeled ductwork in the following schedule (increase thickness of submitted product as required to meet ASHRAE 90.1 requirements):

SERVICE	INSULATION TYPE	JACKET	THICKNESS
Outside air ducts	Rigid Fiberglass	FSJ	2"
Mixed air ducts	Rigid Fiberglass	FSJ	2"
Exposed supply ducts*	Rigid Fiberglass	FSJ	2"
Concealed supply ducts	Flexible Fiberglass	FSJ	1-1/2"
All Ducts located in unconditioned Attics***	Flexible Fiberglass	FSJ	3"
Exhaust and relief ducts downstream of motorized backdraft dampers	Rigid Fiberglass	FSJ	2"
All ducts exposed to weather	Ext. Polystyrene or Fluid-Applied**	SAJ	3"
Exhaust ducts downstream of heat recovery units and desiccant dryers	Rigid Fiberglass	FSJ	2"
Heat recovery units other than kitchen hood exhaust	Rigid Fiberglass	FSJ	1"
Breech. and boiler wind boxes	Fireproofing	See Spec.	3"
Louver blank-off panels	Rigid Fiberglass	FSJ	2"

* Exposed supply branch ducts located in the space they are serving do not require insulation. Exposed supply main ducts running through spaces they serve shall be insulated as exposed supply ducts scheduled above.

** No jacket is required for Fluid-Applied ductwork insulation. The two part Fluid-Applied system serves as insulation and protective jacket.

*** Outside air ductwork between the isolation damper and the outside air intake does not require insulation where it is located in an unheated attic.

CONSTRUCTION VERIFICATION ITEMS

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

END OF SECTION

1 SECTION 230800 - COMMISSIONING OF HVAC

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GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
Commissioning process shall meet all testing and reporting requirements for state and local codes including energy codes.

SUMMARY

Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

Related Sections:

Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

DEFINITIONS

Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

CxA: Commissioning Authority.

HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

ALLOWANCES

Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing are covered by the "Schedule of Allowances" Article in Division 01 Section "Allowances."

UNIT PRICES

Commissioning testing allowance may be adjusted up or down by the "List of Unit Prices" Article in Division 01 Section "Unit Prices" when actual man-hours are computed at the end of commissioning testing.

CONTRACTOR'S RESPONSIBILITIES

Perform commissioning tests at the direction of the CxA.

Attend construction phase controls coordination meeting.

Attend testing, adjusting, and balancing review and coordination meeting.

Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

Provide information requested by the CxA for final commissioning documentation.

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.

CxA'S RESPONSIBILITIES

Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

Direct commissioning testing.

Verify testing, adjusting, and balancing of Work are complete.

Provide test data, inspection reports, and certificates in Systems Manual.

COMMISSIONING DOCUMENTATION

Provide the following information to the CxA for inclusion in the commissioning plan:

Plan for delivery and review of submittals, systems manuals, and other documents and reports.

- 1 Identification of installed systems, assemblies, equipment, and components including design changes that occurred
2 during the construction phase.
3
- 4 Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for
5 HVAC&R systems, assemblies, equipment, and components to be verified and tested.
6
- 7 Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
8
- 9 Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready
10 for testing.
11
- 12 Test and inspection reports and certificates.
13
- 14 Corrective action documents.
15
- 16 Verification of testing, adjusting, and balancing reports.
17
- 18 **SUBMITTALS**
- 19 Certificates of readiness.
20 Certificates of completion of installation, prestart, and startup activities.
21
- 22 **PRODUCTS (Not Used)**
23
- 24 **EXECUTION**
25
- 26 **TESTING PREPARATION**
- 27 Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are
28 operating according to the Contract Documents.
29
- 30 Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are
31 operating according to the Contract Documents, and that pretest set points have been recorded.
32
- 33 Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and
34 balancing reports have been submitted, discrepancies corrected, and corrective work approved.
35
- 36 Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto
37 position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
38
- 39 Inspect and verify the position of each device and interlock identified on checklists.
40 Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of
41 operation.
42
- 43 Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the
44 CxA.
45
- 46 **Testing AND BALANCING VERIFICATION**
47
- 48 Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and
49 certificates to the CxA.
50
- 51 Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to
52 witness testing and balancing Work.
53
- 54 **GENERAL TESTING REQUIREMENTS**
- 55 Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
56

1 Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation
2 through distribution systems to each conditioned space. Testing shall include measuring effectiveness of operational
3 and control functions.
4

5 Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and
6 verify proper response of building automation system controllers and sensors.
7

8 The CxA along with the HVAC&R Contractor, testing and balancing Contractor, and HVAC&R Instrumentation
9 and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems,
10 subsystems, and equipment.
11

12 Tests will be performed using design conditions whenever possible.
13

14 Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design
15 conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set
16 simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After
17 tests, return settings to normal operating conditions.
18

19 The CxA may direct that set points be altered when simulating conditions is not practical.
20

21 The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and
22 altering set points are not practical.
23

24 If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the
25 deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
26 If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and
27 documentation and schedule seasonal tests.
28

29 HVAC&R Instrumentation and Control System Testing: HVAC systems are on stand-alone controls and
30 thermostats. The CxA will confirm all HVAC control function.
31

32 HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test
33 performance of air systems; special exhaust; and other distribution systems, including HVAC&R terminal
34 equipment and unitary equipment.
35

36 END OF SECTION 230800
37

PART 1 - GENERAL

SCOPE

This section contains specifications for fuel pipe and fuel pipe fittings for this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Shop Drawings
- Quality Assurance
- Delivery, Storage, and Handling
- Design Criteria
- Welder Qualifications

PART 2 - PRODUCTS

- Natural Gas
- Vents and Relief Valves
- Unions and Flanges

PART 3 - EXECUTION

- Preparation
- Erection
- Welded Pipe Joints
- Threaded Pipe Joints
- Natural Gas
- Vents and Relief Valves
- Unions and Flanges
- Piping System Leak Tests
- Piping System Test Report
- Construction Verification Items

RELATED WORK

- Section 01 91 01 or 01 91 02 – Commissioning Process
- Section 23 05 23 - General-Duty Valves for HVAC Piping
- Section 23 05 15 - Piping Specialties
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 08 00 – Commissioning of HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ANSI B16.3 Malleable Iron Threaded Fittings
- ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
- ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

TYPE E OR S STEEL PIPE:

Mill certification papers, also known as material test reports, for the pipe furnished for this project, in English. Heat numbers on these papers to match the heat numbers stenciled on the pipe. Chemical analysis indicated on the mill certification papers to meet or exceed the requirements of the referenced ASTM specification.

QUALITY ASSURANCE

Order all Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or each bundle, depending on the size of the pipe, and in accordance with the appropriate ASTM specification.

1 Any installed material not meeting the specification requirements must be replaced with material that
2 meets these specifications without additional cost to the Owner.

3
4 Installation must meet state and local codes and be acceptable to the local code and fire authorities.
5

6 **DELIVERY, STORAGE, AND HANDLING**

7 Promptly inspect shipments to insure that the material is undamaged and complies with specifications.
8

9 Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do
10 not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged.
11 Where end caps are provided or specified, take precautions so the caps remain in place.
12

13 Offsite storage agreements will not relieve the contractor from using proper storage techniques.
14

15 Storage and protection methods must allow inspection to verify products.
16

17 **DESIGN CRITERIA**

18 Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM
19 specifications as listed in this specification.
20

21 Construct all piping for the highest pressures and temperatures in the respective system in accordance
22 with ANSI B31, but not less than 125 psig unless specifically indicated otherwise.
23

24 Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in occupied
25 spaces and ventilation plenum spaces, including plenum ceilings.
26

27 Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a
28 centerline radius of 1.5 pipe diameters.
29

30 Where ASTM A53 grade A pipe is specified, ASTM A53 grade B pipe may be substituted at Contractor's
31 option. Where the grade or type is not specified, Contractor may choose from those commercially
32 available.
33

34 **WELDER QUALIFICATIONS**

35
36 Before any metallic welding is performed, Contractor to submit his Standard Welding Procedure
37 Specification together with the Procedure Qualification Record as required by Section IX of the ASME
38 Boiler and Pressure Vessel Code and/or the National Certified Pipe Welding Bureau.
39

40 Before any polyethylene fusion welding is performed, Contractor to submit certification that the welders to
41 be used on this project have successfully demonstrated proper welding procedures in accordance with
42 the Code of Federal Regulations, Title 49, Part 192, Section 192.285.
43

44 The A/E or Owner reserves the right to test the work of any welder employed on the project, at the
45 Contractor's expense. If the work of the welder is found to be unsatisfactory, the welder shall be
46 prevented from doing further welding on the project.
47
48

49 **PART 2 - PRODUCTS**

50 **NATURAL GAS**

51 2" and Smaller: ASTM A53, type E or S, standard weight (schedule 40) black steel pipe with ASTM
52 A197/ANSI B16.3 class 150 black malleable iron threaded fittings or ASTM A234 grade WPB/ANSI B16.9
53 standard weight, seamless, carbon steel weld fittings.
54
55

56 2-1/2" and Larger: ASTM A53, type E or S, standard weight black steel pipe with ASTM A234 grade
57 WPB/ANSI B16.9 standard weight, seamless, carbon steel weld fittings.
58

59 **VENTS AND RELIEF VALVES**

60 Use pipe and pipe fittings as specified for the system to which the relief valve or vent is connected.
61

62 **UNIONS AND FLANGES**

63 2" and Smaller: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable
64 iron on black steel piping and galvanized malleable iron on galvanized steel piping. Use unions of a
65 pressure class equal to or higher than that specified for the fittings of the respective piping service but not
66 less than 250 psi.
67

1 2-1/2" and Larger: ASTM A181 or A105, grade 1 hot forged steel flanges of threaded, welding and of a
2 pressure class compatible with that specified for valves, piping specialties and fittings of the respective
3 piping service. Flanges smaller than 2-1/2" may be used as needed for connecting to equipment and
4 piping specialties. Use raised face flanges ANSI B16.5 for mating with other raised face flanges on
5 equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for
6 mating with other flat face flanges on equipment.
7
8
9

10 **PART 3 - EXECUTION**

11 **PREPARATION**

12 Remove all foreign material from interior and exterior of pipe and fittings.
13
14

15 **ERECTION**

16 Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a
17 window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute
18 piping as required to clear such interferences. In all cases, consult drawings for exact location of pipe
19 spaces, ceiling heights, door and window openings, or other architectural details before installing piping.
20

21 Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and
22 contract without damage to itself, equipment, or building.
23

24 Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings
25 are not acceptable.
26

27 "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the
28 main.
29

30 Do not route piping through transformer vaults or above transformers, panelboards, or switchboards,
31 including the required service space for this equipment, unless the piping is serving this equipment
32

33 Install all valves, and piping specialties, including items furnished by others, as specified and/or detailed.
34 Make connections to all equipment installed by others where that equipment requires the piping services
35 indicated in this section.
36

37 **WELDED PIPE JOINTS**

38 Make all welded joints by fusion welding in accordance with ASME Codes, ANSI B31, and State Codes
39 where applicable.
40

41 Electrodes shall be Lincoln, or approved equal, with coating and diameter as recommended by the
42 manufacturer for the type and thickness of work being done.
43

44 **THREADED PIPE JOINTS**

45 Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread
46 cement or caulking will be allowed.
47

48 **NATURAL GAS**

49 Pitch horizontal piping down 1" in 60 feet in the direction of flow. Install a 4" minimum depth dirt leg at the
50 bottom of each vertical run and at each appliance. When installing mains and branches, cap gas tight
51 each tee or pipe end which will not be immediately extended. All branch connections to the main shall be
52 from the top or side of the main.
53

54 Do not install gas pipe in a ventilation air plenum.
55

56 If an above ground vent terminates in an area subject to snow accumulation, terminate the line at least
57 five feet above grade.
58

59 Install a shut off valve at each appliance. Provide a valved connection at the main for equipment and
60 appliances furnished by others.
61

62 Piping through a roof shall be run through an approved roof penetration with flashing and counter
63 flashing.
64

65 Each gas pressure reducing valve vent and relief valve vent shall be run separately to a point outside of
66 the building, terminated with a screened vent cap, and located according to gas utility regulations.
67

FUEL GAS PIPING SYSTEM AND TESTING

23 11 00-4

1 Clean all welded piping before all regulators and control valves. Test by placing target cloth over piping
2 and blow with compressed air. Clean piping until target cloth is clean and free of debris.

VENTS AND RELIEF VALVES

4 Install vent and relief valve discharge lines as indicated on the drawings, as detailed, and as specified for
5 each specific valve or piping specialty item. In no event is a termination to occur less than six feet above
6 a roof line.

UNIONS AND FLANGES

9 Install a union or flange, as required, at each automatic control valve and at each piping specialty or piece
10 of equipment which may require removal for maintenance, repair, or replacement. Where a valve is
11 located at a piece of equipment, locate the flange or union connection on the equipment side of the valve.
12 Concealed unions or flanges are not acceptable.

PIPING SYSTEM LEAK TESTS

15 Verify that the piping system being tested is fully connected to all components and that all equipment is
16 properly installed, wired, and ready for operation. If required for the additional pressure load under test,
17 provide temporary restraints at expansion joints or isolate them during the test. Verify that hangers can
18 withstand any additional weight load that may be imposed by the test.

20 Provide all piping, fittings, blind flanges, and equipment to perform the testing.

22 Conduct pressure test with test medium of air or water unless specifically indicated. Minimum test time is
23 indicated in the table below; additional time may be necessary to conduct an examination for leakage.
24 Each test must be witnessed by the Division's representative. If leaks are found, repair the area with new
25 materials and repeat the test; caulking will not be acceptable.

27 Do not insulate pipe until it has been successfully tested.

29 For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air
30 vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

32 For air tests, gradually increase the pressure to not more than one half of the test pressure; then increase
33 the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is
34 reached. Examine all joints and connections with a soap bubble solution or equivalent method. The
35 piping system exclusive of possible localized instances at pump or valve packing shall show no evidence
36 of leaking. After testing is complete, slowly release the pressure in a safe manner.

38 Measure gas system test pressure with a water manometer or an equivalent device calibrated in
39 increments not greater than 0.1 inch water column. System will not be approved until it can be
40 demonstrated that there is no measurable loss of test pressure during the test period.

System	Pressure	Medium	Duration
Natural gas	100 psig	Air	24 hr

44 All pressure tests are to be documented on a Division of Facilities Development form included in this
45 specification.

47 On piping that cannot be tested because of connection to an active line, provide temporary blind flanges
48 and hydrostatically test new section of piping. After completion of test, remove temporary flanges and
49 make final connections to piping. Die penetrate test pass weld or x-ray the piping that was not
50 hydrostatically tested up to the active system.

CONSTRUCTION VERIFICATION ITEMS

52 Contractor is responsible for utilizing the construction verification checklists supplied under specification
53 Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91
54 01 or 01 91 02.

59
60
END OF SECTION

PART 1 - GENERAL

SCOPE

This section includes specifications for all duct systems used on this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Design Criteria

PART 2 - PRODUCTS

- General
- Materials
- Low Pressure Ductwork (Maximum 2 inch pressure class)
- Duct Sealant
- Gaskets

PART 3 - EXECUTION

- Installation
- Low Pressure Duct (Maximum 2 inch pressure class)
- Cleaning
- Leakage Test
- Construction Verification

APPENDIX

- Duct Leakage Test Report
- Duct Structural Test Report

RELATED WORK

- Section 23 01 30.51 – HVAC Air Duct Cleaning
- Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC
- Section 23 08 00 – Commissioning of HVAC
- Section 23 33 00 – Air Duct Accessories

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

- ANSI SS-EN 485-2 Aluminum and Aluminum Alloys-Sheet, Strip and Plate-Part 2: Mechanical Properties
- ASTM B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- ASTM A90 Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
- ASTM A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- ASTM A623 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- ASTM A527 Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
- ASTM 924 Standard Specification for General Requirements for Sheet Steel, Metallic-coated by the Hot-dip Method
- ASTM C 1071 Specification for Fibrous Glass Duct Lining Insulation
- ASTM C 411 Test Method for Hot Surface Performance of High Temperature Thermal Insulation
- ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials
- ASTM C 1338 Test Method for Determining Fungal Resistance of Insulation Materials and Facings
- ASTM G 21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- ASTM C 916 Standard Specification for Adhesives for Duct Thermal InsulationNFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems
- UL 181 Standard for Safety for Factory Made Air Ducts and Air Connectors.

1 NAIMA Fibrous Glass Duct Liner Standard

2
3
4 **QUALITY ASSURANCE**

5 Refer to division 1, General Conditions, Equals and Substitutions.

6
7 **SHOP DRAWINGS**

8 Refer to division 1, General Conditions, Submittals.

9
10 Include manufacturer's data and/or Contractor data for the following:

- 11
- 12 • Fabrication and installation drawings.
 - 13
 - 14 • Schedule of duct systems including material of construction, gauge, pressure class,
15 system class, method of reinforcement, joint construction, fitting construction, and
16 support methods, all with details as appropriate.
 - 17
 - 18 • Duct sealant and gasket material.
 - 19
 - 20 • Duct liner including data on thermal conductivity, air friction correction factor, and
21 limitation on temperature and velocity.
 - 22

23 **DESIGN CRITERIA**

24 Construct all ductwork to be free from vibration, chatter, objectionable pulsations and leakage under
25 specified operating conditions.

26
27 Use material, weight, thickness, gauge, construction and installation methods as outlined in the following
28 SMACNA publications, unless noted otherwise:

- 29
- 30 • HVAC Duct Construction Standards, Metal and Flexible, latest edition
 - 31 • HVAC Air Duct Leakage Test Manual, latest edition
 - 32 • HVAC Systems - Duct Design, latest edition
 - 33 • Rectangular Industrial Duct Construction Standard, latest edition
 - 34 • Round Industrial Duct Construction Standards, latest edition
 - 35

36 Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke
37 developed rating no higher than 50.

38
39 **DELIVERY, STORAGE AND HANDLING**

40 Promptly inspect shipments to ensure that Ductwork is undamaged and complies with the specification.

41
42 Protect Ductwork against damage.

43
44 Protect Ductwork by storing inside or by durable, waterproof, above ground packaging. Do not store
45 material on grade. Protect Ductwork from dirt, dust, construction debris and foreign material. Where end
46 caps/packaging are provided, take precautions so caps/packaging remain in place and free from damage.

47
48 Offsite storage agreements do not relieve the contractor from using proper storage techniques.

49
50 Storage and protection methods must allow inspection to verify products.

51
52
53 **PART 2 - PRODUCTS**

54
55 **GENERAL**

56 All sheet metal used for construction of duct shall be 24 gauge or heavier except for round and spiral
57 ductwork and spiral duct take-offs 12" and below may be 26 gauge where allowed in SMACNA HVAC
58 Duct Construction Standards, Metal and Flexible, latest edition.

59
60 Duct sizes indicated on plans are net inside dimensions; where duct liner is specified, dimensions are net,
61 inside of liner.

62
63 **SUPPORTS, ANCHORAGE AND RESTRAINTS**

64 General:

1 When supports, anchorages, and seismic restraints for equipment, and supports and seismic restraints
2 for ductwork are not shown on the Drawings, the contractor shall be responsible for their design.
3 Seismic restraints and anchorages shall resist seismic forces as specified in the latest edition of the
4 International Building Code for the seismic zone in which the project is constructed.
5 Seismic restraints shall follow the provisions described in Section 23 0548, Vibration and Seismic Control
6 for HVAC Piping and Equipment.
7 Seismic restraints shall not introduce stresses in the ductwork caused by thermal expansion or
8 contraction.
9 Connections to structural framing shall not introduce twisting, torsion, or lateral bending in the framing
10 members. Provide supplementary steel as required.

11
12 Suspended Ductwork: Seismic restraints shall be in accordance with the latest edition of the SMACNA
13 "Seismic Restraint Manual - Guidelines for Mechanical Systems" for the seismic hazard level
14 corresponding to the seismic zone in which the project is constructed.

15
16 Engineered Support Systems: The following support systems shall be designed, detailed, and bear the
17 seal of a professional engineer registered in the State having jurisdiction:
18 Supports and seismic restraints for suspended ductwork and equipment.
19 Support frames for ductwork and equipment which provide support from below.
20 Equipment and ductwork support frame anchorage to supporting slab or structure.

21 22 **DUCTWORK PRESSURE CLASS**

23
24 Minimum acceptable duct pressure class, for all ductwork except transfer ductwork, is 2 inch W.G.
25 positive or negative. Transfer ductwork minimum acceptable duct pressure class is 1 inch W.G. positive
26 or negative, depending on the application.
27

28 29 **MATERIALS**

30 **GALVANIZED STEEL SHEET:**

31 Use ASTM A 653 galvanized steel sheet of lock forming quality. Galvanized coating to be 1.25 ounces
32 per square foot, both sides of sheet, G90 in accordance with ASTM A90. Provide "Paint Grip" finish or
33 galvaneal sheetmetal for ductwork that will be painted.
34

35 **UNCOATED BLACK STEEL SHEET:**

36 First quality, soft steel sheet capable of welding or double seaming without fracture.
37

38 **ALUMINUM SHEET:**

39 Use ANSI/ASTM B209 aluminum sheet, alloy 3003H-14, capable of double seaming without fracture.
40

41 **STAINLESS STEEL SHEET:**

42 Use ASTM A167, Type 304 or 316 stainless steel sheet as specified, 316L if welded ductwork, with No.
43 2B finish for concealed work and No. 3 finish for exposed work.
44

45 **POLYVINYLCHLORIDE COATED STEEL SHEET:**

46 Use hot-dipped galvanized steel sheet with prime coat and a polyvinyl chloride film on both sides.
47 Thickness of coating to be a minimum of 4 mils on each side. United Sheet Metal Uni-Coat, made by
48 United McGill Co., may be used at contractor's option.
49

50 Where any duct surface is scratched, marred, or otherwise damaged, paint with PVC aerosol spray.
51

52 All couplings shall be slip-joint construction with a minimum 2 inches insertion length. Seal all couplings
53 with sealants as specified.
54

55 **LOW PRESSURE DUCTWORK (Maximum 2 inch pressure class)**

56 Fabricate and install ductwork in sizes indicated on the drawings and in accordance with SMACNA
57 recommendations, except as modified below.
58

59 Construct so that all interior surfaces are smooth. Use slip and drive or flanged and bolted construction
60 when fabricating rectangular ductwork. Use spiral lock seam construction when fabricating round spiral
61 ductwork. Sheet metal screws may be used on duct hangers, transverse joints and other SMACNA
62 approved locations if the screw does not extend more than 1/2 inch into the duct.
63

1 Use elbows and tees with a center line radius to width or diameter ratio of 1.5 wherever space permits.
 2 When a shorter radius must be used due to limited space, install single wall sheet metal splitter vanes in
 3 accordance with SMACNA publications, Type RE 3. Where space will not allow and the C value of the
 4 radius elbow, as given in SMACNA publications, exceeds 0.31, use rectangular elbows with turning vanes
 5 as specified in Section 23 33 00. Square throat-radius heel elbows will not be acceptable. Straight taps
 6 or bullhead tees are not acceptable.
 7

8 Where rectangular elbows are used, provide turning vanes in accordance with Section 23 33 00.
 9

10 Provide expanded take-offs or 45 degree entry fittings (boot T) for branch duct connections with branch
 11 ductwork airflow velocities greater than 400 fpm. Square edge 90-degree take-off fittings or straight taps
 12 will not be accepted.
 13

14 Longitudinal seams on rectangular duct shall be Pittsburgh or Button punch snap lock. Button punch
 15 snaplock construction will not be accepted on aluminum ductwork.
 16

17 Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence
 18 upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45
 19 degrees.
 20

21 SINGLE WALL HOUSING PLENUMS

22 Fabricate from galvanized steel, unless otherwise noted.

23 Minimum gauge not less than 18-gauge except panels 10-feet-1-inch or longer 16-gauge.

24 Housing panels constructed in accordance with the latest edition of SMACNA HVAC Duct Construction
 25 Standards.

26 Minimum pressure classification for single wall housing panels is 2-inches W.G. positive or negative.

27 Maximum allowable panel width 24-inches with standing interlocking seams.

28 Openings in panels for air inlets/outlets, or access doors reinforced per SMACNA standards.

29 Provide intermediate reinforcing and/or bracing when spans are 8-feet or longer.

30 Line all interior surfaces of single wall plenums with minimum of 2-inch thick acoustical lining.
 31

32 Access Doors:

33 Construct of 20-gauge galvanized steel, double wall construction.

34 Install in opening in plenum panel reinforced with 10-gauge channel.

35 Doors mounted on three hinges and shall seat against neoprene gaskets.

36 Doors in plenums at humidifiers shall have 12-inch by 12-inch double glass inserts from observation.

37 Doors 24-inch by 60-inch height unless otherwise indicated.
 38

39 DUCT SEALANT

40 Manufacturer: 3M 800, 3M 900, H.B. Fuller/Foster, Hardcast, Hardcast Peal & Seal, Lockformer cold
 41 sealant, Mon-Eco Industries, United Sheet Metal, or approved equal. Silicone sealants are not allowed in
 42 any type of ductwork installation.
 43

44 Install sealants in strict accordance with manufacturer's recommendations, paying special attention to
 45 temperature limitations. Allow sealant to fully cure before pressure testing of ductwork, or before startup
 46 of air handling systems.
 47

48 GASKETS

49 2 INCH PRESSURE CLASS AND LOWER:

50 Soft neoprene or butyl gaskets in combination with duct sealant for flanged joints.
 51
 52

53 3 INCH PRESSURE CLASS AND HIGHER:

54 Butyl gaskets.
 55

56 FUME HOOD EXHAUST;

57 Butyl gaskets.
 58

59 FLEXIBLE DUCTS

60 Acceptable Manufacturers:

61 Thermaflex

62 M-KE

63 Gen Flex IMP-25S.

1 Other Manufacturers: Submit Substitution Request.

2
3 Description:

4 Flexible air duct with CPE or metal film liner permanently bonded to coated spring steel wire helix with 1-
5 inch thick fiberglass insulation blanket covered with fiberglass reinforced metal film vapor barrier jacket.
6 Duct rated for 6-inch W.G. positive and 1-inch W.G. negative.

7
8 **PART 3 - EXECUTION**

9
10 **INSTALLATION**

11 Verify dimensions at the site, making field measurements and drawings necessary for fabrication and
12 erection. Check plans showing work of other trades and consult with Architect in the event of any
13 interference.

14
15 Make allowances for beams, pipes or other obstructions in building construction and for work of other
16 contractors. Transform, divide or offset ducts as required, in accordance with SMACNA HVAC Duct
17 Construction Standards, Figure 4-7, except do not reduce duct to less than six inches in any dimension
18 and do not exceed an 8:1 aspect ratio. Where it is necessary to take pipes or similar obstructions through
19 ducts, construct easement as indicated in SMACNA HVAC Duct Construction Standards, Figure 4-8, Fig.
20 E. In all cases, seal to prevent air leakage. Pipes or similar obstructions may not pass through high
21 pressure or fume exhaust ductwork.

22
23 Seal traverse joints with an approved mastic during joining procedure or tape after joining to provide
24 airtight duct system.

25
26 Low pressure ductwork hanger and support systems in accordance with SMACNA HVAC Duct
27 Construction Standards. Wire supports are not allowed.

28
29 Provide supplementary steel for support of ductwork in shafts and between building structural members.
30 Fabricate changes in direction to permit easy air flow, using full 1.5D radius bends or fixed turning vanes
31 in square elbows. Radius elbows less than 1.5D radius shall have splitter vanes.

32
33 Change in duct size or shape necessitated by interference made using rectangular equivalents of equal
34 velocity.

35
36 Where pipe, structural member, or other obstruction passes through a duct, provide streamlined sheet
37 metal collar around member and increase duct size to maintain net free area. Fit collar and caulk to
38 make air tight.

39
40 Test openings for test and balance work will be provided under Section 23 05 93.

41
42 Provide frames constructed of angles or channels for coils, filters, dampers or other devices installed in
43 duct systems, and make all connections to such equipment including equipment furnished by others.
44 Secure frames with gaskets and screws or nut, bolts and washers.

45
46 Install duct to pitch toward outside air intakes and drain to outside of building. Solder or seal seams to
47 form watertight joints.

48
49 Where two different metal ducts meet, the joint shall be installed in such a manner that metal ducts do not
50 contact each other by using proper seal or compound.

51
52 Install all motor operated dampers and connect to or install all equipment furnished by others.

53
54 Do not install ductwork through dedicated electrical rooms or spaces unless the ductwork is serving this
55 room or space.

56
57 Locate ducts with sufficient space around equipment to allow normal operating and maintenance
58 activities.

59
60 Provide adequate access to ductwork for cleaning purposes.

61
62 Provide temporary capping of ductwork openings to prevent entry of dirt, dust and foreign material.

63
64 Protect diffusers, registers and grilles with plastic wrap or some other approved form of protection to
65 maintain dirt and dust free and to prevent entry of dirt, dust and foreign material into the Ductwork.

1 During construction provide temporary closures of metal or taped polyethylene on open ductwork to
2 prevent construction dust from entering ductwork system.

3 4 **Flexible Connectors:**

5 Make connections to fans and other rotating equipment with flexible
6 connectors with 2-inch minimum clearance between casing and ductwork. Not required on
7 internally spring isolated units.

8 9 **Flexible Ducts:**

10 Make connections at ends using draw band strap and a minimum of 2 wraps of duct tape.
11 Suspend center spans from structure above using wire as required by code. Connect to manufacturer's
12 eyelet on jacket or use 1-inch wide galvanized steel strap with single loop at top and smooth edges.
13 Suspending duct by laying it on the ceiling is prohibited.
14 Avoid crimping flex duct. All changes in direction shall be made using 2D radius. Duct connections to
15 grilles, registers and diffusers using less than 2D radius bends are not acceptable. Where space is
16 constricted, use sheet metal elbows or Thermaflex Flex Boots (or equal).

17 18 **DUCTWORK SUPPORT**

19 Support ductwork in accordance with SMACNA HVAC Duct Construction Standards, Figure 5-5, except
20 supporting ductwork with secure wire method is not allowed.

21
22 Support with 3/32 inch, 7 x 7, stainless steel air-craft cable, with matching serrated spring loaded wedge
23 mechanism fasteners rated for actual load. Steel cable hanging systems will be allowed on round
24 ductwork under 12 inches diameter if installed utilizing two fasteners with two cable loops. Comply with
25 the manufacturer's installation instructions.

26 27 **LOW PRESSURE DUCT (Maximum 2 inch pressure class)**

28 Seal traverse joints, longitudinal seams, and applicable duct wall penetrations with an approved mastic
29 during joining procedure or tape after joining to provide airtight duct system. Duct sealing and leakage
30 shall meet all applicable energy code requirements.

31
32 Install a manual balancing damper in each branch duct and for each diffuser or grille. The use of splitter
33 dampers, extractors, or grille face dampers will not be accepted for balancing dampers.

34
35 Hangers must be wrapped around bottom edge of duct and securely fastened to duct with sheetmetal
36 screws or pop rivets. Trapeze hangers may be used at contractor's option. Low pressure ductwork
37 hanger and support systems in accordance with SMACNA HVAC Duct Construction Standards. Wire
38 supports are not allowed.

39 Provide supplementary steel for support of ductwork in shafts and between building
40 structural members.

41 Fabricate changes in direction to permit easy air flow, using full 1.5D radius bends or fixed turning vanes
42 in square elbows. Radius elbows less than 1.5D radius shall have splitter vanes.

43 Change in duct size or shape necessitated by interference made using rectangular equivalents of equal
44 velocity.

45 Where pipe, structural member, or other obstruction passes through a duct, provide streamlined sheet
46 metal collar around member and increase duct size to maintain net free area. Fit collar and caulk to
47 make air tight.

48 49 **Dampers:**

50 Install where shown and where necessary to complete final balancing of system.

51 Install regulators as specified in Section 23 3300, Air Duct Accessories for each specific project condition.
52 Leave all dampers locked wide open in preparation for balancing.

53 54 **Single Wall Housing Plenums:**

55 Install housing plenums in accordance with SMACNA HVAC Duct Construction Standards, latest edition.

56 All joints and seams sealed with high pressure duct sealer or gaskets and fastened with bolts, screws, or
57 pop rivets.

58 Pipe, duct, conduit, and control penetrations sealed to prevent air leakage using close off sheets and
59 strips.

60 Securely anchor housing panels to floor or roof curbs.

61 Block outside air or return air dampers open to prevent damage during construction until automatic
62 control system is operational and adjusted.

1 Provide access doors where indicated on drawings and where required to provide access for cleaning
2 and maintenance. Access doors installed to open against air pressure.
3 Slope plenum and connected ductwork to drain towards the exterior louver or building exterior opening.
4 For single wall plenums installed behind exterior louvers or wall openings, slope plenum floor and
5 connected ductwork at 1/4-in/ft to drain towards the exterior louver or opening.
6 For single wall plenums installed below roof ventilators or roof openings, slope floor of plenum at 1/4-inch
7 per foot to drain connection. Pipe drain connection to floor drain.

8
9 **Stainless Steel Duct:**

10 Install stainless steel ductwork similar to galvanized ductwork per
11 SMACNA standards.

12
13 **CLEANING**

14 Remove all dirt and foreign matter from the entire duct system and clean diffusers, registers, grilles and
15 the inside of air-handling units before operating fans.

16
17 Clean duct systems with high power vacuum machines where systems have been used for temporary
18 heat, air-conditioning, or ventilation purposes during construction. Protect equipment that may be harmed
19 by excessive dirt with filters, or bypass during cleaning.

20
21
22 **LEAKAGE TEST**

23 Test all ductwork in accordance with test methods described in Section 5 of SMACNA HVAC Air Duct
24 Leakage Test Manual. Do not insulate ductwork until it has been successfully tested. Test pressure shall
25 be equal to the duct pressure class.

26
27 If excessive air leakage is found locate leaks, repair the duct in the area of the leak, seal the duct, and
28 retest.

29
30 Leakage rate shall not exceed more than 5% of the system air quantity for low pressure ductwork,
31 determined in accordance with Appendix C of the SMACNA HVAC Air Duct Leakage Test Manual.

32
33 Leakage test for ductwork downstream of air terminal devices may be omitted but will not relieve the
34 contractor from duct sealing requirements.

35
36 Submit a signed report to the Division's Construction Representative, indicating test apparatus used,
37 results of the leakage test, and any remedial work required to bring duct systems into compliance with
38 specified leakage rates.

39
40 **CONSTRUCTION VERIFICATION**

41 Contractor is responsible for utilizing the construction verification checklists supplied under specification
42 Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91
43 01 or 01 91 02.

44
45
END OF SECTION

PART 1 - GENERAL**SCOPE**

This sections includes accessories used in the installation of duct systems. Included are the following topics:

PART 1 - GENERAL

Related Work

Reference

Reference Standards

Quality Assurance

Shop Drawings

Operation and Maintenance Data

PART 2 - PRODUCTS

Manual Volume Dampers

Turning Vanes

Control Dampers

Smoke Detectors

Access Doors

Duct Lining

Flashings

Duct Flexible Connections

Sound Attenuators

Hoods for Intake and Exhaust

PART 3 - EXECUTION

Manual Volume Dampers

Turning Vanes

Control Dampers

Smoke Detectors

Access Doors

Flashings

Duct Flexible Connections

Sound Attenuators

Hoods for Intake and Exhaust

Construction Verification

RELATED WORK

Section 23 05 29 – Hanger and Supports for HVAC Piping and Equipment

Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment

Section 23 08 00 – Commissioning of HVAC

Section 23 31 00 – HVAC Ducts and Casings

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

NFPA 90A Standard for Installation of Air Conditioning and Ventilating Systems

SMACNA HVAC Duct Construction Standards - Metal and Flexible, latest edition

UL 214

UL 555 (6th edition) Standard for Fire Dampers and Ceiling DampersUL 555S (4th edition) Leakage Rated Dampers for Use in Smoke Control Systems**QUALITY ASSURANCE**

Refer to division 1, General Conditions, Equals and Substitutions

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Submit for all accessories and include dimensions, capacities, ratings, installation instructions, and appropriate identification.

Include certified test data on dynamic insertion loss, self-noise power levels, and aerodynamic performance of sound attenuators.

Submit manufacturer's color charts where finish color is specified to be selected by the Architect/Engineer.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

PART 2 - PRODUCTS**MANUAL VOLUME DAMPERS**

Manufacturers: Ruskin, Vent Products, Air Balance, or approved equal.

Dampers must be constructed in accordance with SMACNA Fig. 2-12, Fig. 2-13, and notes relating to these figures, except as modified below.

Reinforce all blades to prevent vibration, flutter, or other noise. Construct dampers in multiple sections with mullions where width is over 48 inches. Use rivets or tack welds to secure individual components; sheet metal screws will not be accepted. Provide operators with locking devices and damper position indicators for each damper; use an elevated platform on insulated ducts. Provide end bearings or bushings for all volume damper rods penetrating ductwork constructed to a 1" w.c. pressure class or above.

TURNING VANES

Manufacturers: Aero Dyne, Anemostat, Barber-Colman, Hart & Cooley, or approved equal.

Construct turning vanes and runners for square elbows in accordance with SMACNA turning vane construction standards. Single surface turning vanes allowed for blade length up to 16", pressure class up to 2" and air velocities up to 1,000 fpm. Airfoil type vanes allowed in all locations and required if single surface turning vanes not specifically allowed.

Automatic Dampers:

Furnish and install, at locations shown on plans, or in accordance with schedules, control dampers manufactured by an ISO 9001 accredited manufacturer that meet the following minimum construction requirements. Damper frames (when size permits) shall be constructed using the UniFrame Design Concept (UDC) and shall be a roll-formed structural hat channels, reinforced at the corners, formed from a single piece of minimum 16-gauge (1.6) galvanized steel. The roll-formed frames shall be structurally superior to 13 gage U-channel frames.

Damper blades shall be airfoil type (single surface damper blades allowed for damper velocities of less than 1,000 fpm) for superior pressure drop performance and low noise generation. They shall be formed from a single piece of galvanized steel through a 20-stage roll-form process and shall be equivalent to other type blades constructed from 14-gauge (2.0) galvanized steel. Blade edge seals shall be flexible and suitable for -72 degrees F (-60 degrees C) to +275 degrees F (+135 degrees C) mechanically locked into the blade edge yet easily replaceable in the field.

Jamb seals shall be flexible stainless steel, compression type to prevent leakage between the end of the blade and the damper frame. Use of the blade end to overlap the frame for a jamb seal is not acceptable. Adhesive or clip-on type seals for blade and jamb seals are not acceptable.

Bearings shall be corrosion resistant, permanently lubricated stainless steel sleeve type turning in an extruded hole in the damper frame. Axles shall be 1/2-inch (13) plated steel, hexagon shaped and positively locked into the damper blades (round axles are not acceptable). Linkage shall be concealed out of airstream, within the damper frame to reduce pressure drop, noise and maintenance.

Submittals must include leakage, maximum airflow and maximum pressure ratings based on AMCA Publication 500. Dampers shall meet the leakage requirements of the International Energy Conservation Code by leaking less than 3 cfm/sq. ft. at 1-inch of static pressure and shall be AMCA licensed as Class 1A.

Dampers shall be Ruskin model CD60 or equal.

SMOKE DETECTORS

Smoke detectors are furnished and installed by the Electrical Contractor.

ACCESS DOORS

1 Access doors to be designed and constructed for the pressure class of the duct in which the door is to be
2 installed. Doors in exposed areas shall be hinged type with cam sash lock. Hinges shall be aluminum or
3 steel full length continuous piano type. Doors in concealed spaces shall be secured in place with cam
4 sash latches. For both hinged and non-hinged doors provide sufficient number of cam sash latches to
5 provide air tight seal when door is closed. Do not use hinged doors in concealed spaces if this will restrict
6 access. Use minimum 1" deep 24 gauge galvanized steel double wall access doors with minimum 24
7 gauge galvanized steel frames. For non-galvanized ductwork, use minimum 1" deep double wall access
8 door with frame that shall use materials of construction identical to adjacent ductwork. Provide double
9 neoprene gasket that shall provide seals from the frame to the door and frame to the duct. When access
10 doors are installed in insulated ductwork or equipment provide insulated doors with insulation equivalent
11 to what is provided for adjacent ductwork or equipment. Access doors constructed with sheet metal
12 screw fasteners will not be accepted.

13
14 Use insulated, 1-1/2 hour UL 1978 listed and labeled access doors in kitchen exhaust ducts.

15
16 **DUCT LINING**

17
18 Manufacturer: Manville, Owens-Corning, Knauf, or approved equal.

19
20 1 inch thick, flexible, mat faced insulation made from inorganic glass fibers bonded with a thermosetting
21 resin with thermal conductivity of .25 Btu inch / hour sq.ft. deg F.
22 Meet erosion testing per UL 181 or ASTM C 1071 for 5000 fpm maximum air velocity. ASTM C 411
23 maximum operating temperature rating of 250 deg F. ASTM E84 flame spread less than 25 and smoke
24 developed less than 50.

25
26 Meet requirements of ASTM C 1338 and ASTM G21 for fungi resistance.

27
28 Install liner using adhesive conforming to ASTM C 916.

29
30 **FLASHINGS**

31
32 Provide flashing to completely weatherproof connection of ductwork to louvers. Flashing to be
33 constructed of material similar to louver material.

34
35 Flashing and counterflashing for roof curbs will be provided by others.

36
37 Flashing and curbs for duct and pipe penetrations of roof assemblies to be in accordance with details.

38
39 **DUCT FLEXIBLE CONNECTIONS**

40 Material to be fire retardant, be UL 214 listed, and meet the requirements of NFPA 90A.

41
42 Connections to be a minimum of 3 inches wide, crimped into metal edging strip, and air tight.
43 Connections to have adequate flexibility and width to allow for thermal expansion/contraction, vibration of
44 connected equipment, and other movement.

45
46 Use coated glass fiber fabric for all applications. Material for inside applications other than corrosive
47 environments, fume exhaust, or kitchen exhaust to be double coated with neoprene, air and water tight,
48 suitable for temperatures between -10°F and 200°F, and have a nominal weight of 30 ounces per square
49 yard. Material used for outdoor applications other than corrosive environments, fume exhaust, or kitchen
50 exhaust to be double coated with Hypalon, air and water tight, suitable for temperatures between -10°F
51 and 250°F, and have a nominal weight of 26 ounces per square yard.

52
53 **HOODS FOR INTAKE AND EXHAUST**

54 Manufacturers: Acme, Ammerman, Carnes, Cook, Greenheck, Louvers and Dampers, Penn, or approved
55 equal.

56
57 Use louvered penthouse type hoods with drainable blade louvers.

58
59 Construct hoods of aluminum or galvanized steel with a baked enamel finish; color to be selected by the
60 Architect during the submittal stage.

61
62 Provide bird screen and motor operated duct mounted damper for each hood.

63
64 **PART 3 - EXECUTION**

MANUAL VOLUME DAMPERS

Install manual volume dampers in each branch duct and for each grille, register, or diffuser as far away from the outlet as possible while still maintaining accessibility to the damper. Install so there is no flutter or vibration of the damper blade(s).

TURNING VANES

Manufacturers: Aero Dyne, Anemostat, Barber-Colman, Hart & Cooley, or approved equal.

Install turning vanes in all rectangular, mitered elbows in accordance with SMACNA standards and/or manufacturer's recommendations.

Construct turning vanes and runners for square elbows in accordance with SMACNA turning vane construction standards. Single surface turning vanes allowed for blade length up to 16", pressure class up to 2" and air velocities up to 1,000 fpm. Airfoil type vanes allowed in all locations and required if single surface turning vanes not specifically allowed. Install double wall, airfoil, 2 inch radius vanes in ducts with vane runner length 18" or greater and air velocity less than 2000 fpm. Install double wall, airfoil, 4-1/2 inch radius vanes in ducts with vane runner length 18" or greater and air velocity 2000 fpm or greater.

If duct size changes in a mitered elbow, use single wall type vanes with a trailing edge extension. If duct size changes in a radius elbow or if short radius elbows must be used, install sheetmetal turning vanes in accordance with SMACNA construction standards.

CONTROL DAMPERS

Install dampers in locations indicated on the drawings, as detailed, and according to the manufacturer's instructions. Install blank-off plates or transitions where required for proper mixing of airstreams in mixing plenums. Provide adequate operating clearance and access to the operator. Install an access door adjacent to each control damper for inspection and maintenance.

ACCESS DOORS

Install access doors where specified, indicated on the drawings, and in locations where maintenance, service, cleaning or inspection is required. Examples include, but are not limited to motorized dampers, fire and smoke dampers, smoke detectors, fan bearings, heating and cooling coils, filters, valves, and control devices needing periodic maintenance.

Size and numbers of duct access doors to be sufficient to perform the intended service. Minimum access door size shall be 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, or other size as indicated. Install access doors on both inlet and outlet sides of reheat coils as well as other duct mounted coils.

FLEXIBLE DUCT

Manufacturers: See 23 31 00 HVAC Ducts and Casings

Flexible duct may only be used for final connections of air inlets and outlets at diffuser, register, and grille locations. Where flexible duct is used, it shall be the minimum length required to make the final connections, but no greater than 4 feet in length, and have no more than one 90 degree bend and a total bend angle of less than 90 degrees.

Secure inner jacket of flexible duct in place with stainless steel metal band clamp. Secure insulation vapor barrier jacket in place with steel or nylon draw band. Sheetmetal screws and/or duct tape will not be accepted.

Flexible duct used to compensate for misalignment of main duct or branch duct will not be accepted.

Individual sections of flexible ductwork shall be of one piece construction. Splicing of short sections will not be accepted.

Flexible ductwork used as transfer duct shall be sized for a maximum velocity of 300 fpm.

Penetration of any partition, wall, or floor with flexible duct will not be accepted.

DUCT LINING

Apply lining to the following ductwork:

Do not apply lining to the following ductwork:

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- Outside air ductwork.

Install liner in compliance with the latest edition of NAIMA’s Fibrous Glass Duct Liner Standard. Locate longitudinal joints at the corners of duct only. Cut and fit to assure lapped, compressed joints. Coat all transverse and longitudinal joints and edges with adhesive. Provide metal nosing on leading edge where lined duct is preceded by unlined duct. Adhere liner to duct with full coverage area of adhesive. Additionally secure liner to duct using mechanical fasteners spaced as recommended by the liner manufacturer without compressing liner more than 1/8” with the fasteners.

FLASHINGS

Flashing for roof curbs, equipment supports or rails located on roof, will be installed by others.

DUCT FLEXIBLE CONNECTIONS

Install at all duct connections to rotating or vibrating equipment, including air handling units (unless unit is internally isolated), fans, or other motorized equipment in accordance with SMACNA Figure 2-19. Install thrust restraints to prevent excess strain on duct flexible connections at fan inlets and outlets; see Related Work.

For applications in corrosive environments or fume exhaust systems, use a double layer of the Teflon[®] coated fabric when making the connector.

SOUND ATTENUATORS

Install sound attenuators in locations indicated on the drawings. Where modular installation is required, install units in a galvanized steel frame equipped with gaskets or seals between modules to prevent bypass of air.

HOODS FOR INTAKE AND EXHAUST

Install in locations indicated on the drawings, coordinating the roof opening location with the General Prime Contractor. Curbs are covered in Section 23 05 29.

CONSTRUCTION VERIFICATION

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

END OF SECTION

PART 1 - GENERAL**SCOPE**

This section includes specifications for air terminal equipment. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Submittals
- Design Criteria

PART 2 - PRODUCTS

- Manufacturers
- Round Ceiling Diffusers
- Perforated Ceiling Diffusers
- Square Ceiling Diffusers - High Performance
- Square Ceiling Diffusers - Plaque
- Square Ceiling Diffusers
- Side-Wall Registers and Grilles
- Eggcrate Grille
- Heavy Duty Side-wall Return/Exhaust Grille
- Door Grille
- Construction Verification Items

PART 3 - EXECUTION

- Installation

RELATED WORK

- Section 01 91 01 or 01 91 02 – Commissioning Process
- Section 23 08 00 - Commissioning of HVAC
- Section 23 31 00 - HVAC Ducts and Casings
- Section 23 33 00 - Air Duct Accessories
- Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- UL 181 - Factory-Made Air Ducts and Connectors.
- ARI-ADC Standard 880

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

SUBMITTALS

Refer to division 1, General Conditions, Submittals.

Furnish submittal information including, but not limited to, the following:

- Manufacturer's name and model number
- Identification as referenced in the documents
- Capacities/ratings
- Materials of construction
- Sound ratings

- 1 Dimensions
- 2 Finish
- 3 Color selection charts where applicable
- 4 Manufacturer's installation instructions
- 5 All other appropriate data
- 6

DESIGN CRITERIA

8 All performance data shall be based on tests conducted in accordance with Air Diffusion Council (ADC)
9 Test Code 1062 GRD 84.

PART 2 - PRODUCTS

MANUFACTURERS

15 Manufacturers: Carnes, Krueger, Titus, Metal-Aire, and Price, and United Sheet Metal.

17 Acceptable manufacturers for specific products are listed under each item.

ROUND CEILING DIFFUSERS

22 Titus Series R-OMNI, TMRA, Carnes Series SSAA, Metal Aire Series 3100, Price Series RCDA

24 Spun aluminum or steel with uniform 360° discharge pattern.

26 Adjustable inner cones surrounded by a ceiling plate collar designed to reduce ceiling smudges.

28 Diffusers as shown on drawings and/or as scheduled.

30 White, baked enamel finish or powder coat finish, unless otherwise indicated.

PERFORATED CEILING DIFFUSERS

35 Titus model PSS, Carnes series SP or SL, Price series PDMC

37 Aluminum (Steel) unless otherwise indicated, and furnished with frame type appropriate to installation.

39 Field adjustable pattern controllers accessible through removable or hinged face plate. Pattern controller
40 mounted directly under the neck of the diffuser and fully adjustable for either side blow or corner blow
41 pattern.

43 Provide round or square neck duct adapters for each unit for top connection or side connection as
44 appropriate to the space.

46 White, baked enamel finish or powder coat finish, unless otherwise indicated. Flat black diffuser can
47 vanes and frame interior.

PERFORATED CEILING RETURN

52 Titus model PAR, Carnes series SP or SL, Price series PDDR, and Krueger 1190 series.

54 Aluminum (Steel) unless otherwise indicated, and furnished with frame type appropriate to installation.

56 52% open area perf face with steel back pan. Square, rectangular, or round duct connection.

1 Provide round or square neck duct adapters for each unit for top connection or side connection as
2 appropriate to the space.

3
4 White, baked enamel finish or powder coat finish, unless otherwise indicated. Flat black diffuser can
5 vanes and frame interior.

6
7
8 **SQUARE CEILING DIFFUSERS - High Performance**

9
10 High performance type diffuser incorporating short throws and low NC levels. Titus model TMS, Carne
11 series
12 SF, Price model SCD, Metal Aire series 5800, and Krueger series 1400.

13
14 Diffusers to be aluminum (Steel) unless otherwise indicated, louvered face furnished with frame type
15 appropriate to installation.

16
17 Diffuser shall have throw characteristics of a round diffuser having a 360° horizontal blow pattern.

18
19 Louver cones shall be one-piece construction with no corner joints.

20
21 White, baked enamel finish or powder coat finish, unless otherwise indicated.

22
23
24 **SQUARE CEILING DIFFUSERS - Plaque**

25
26 Titus model OMNI, Carnes series SFPA/SHPA, Price model SMDP, Metal Aire series 5750, and Krueger
27 series PLQ/5PLQ.

28
29 Aluminum (Steel) unless otherwise indicated, louvered face furnished with frame type appropriate to
30 installation.

31
32 Directional blow pattern as shown on the drawings and/or as scheduled.

33
34 One-piece removable square face plaque with one-piece backpan.

35
36 White, baked enamel finish or powder coat finish, unless otherwise indicated.

37
38
39 **SQUARE CEILING DIFFUSERS**

40
41 Titus model MCD, TDC/TDC-AA, Carnes series SK or SE, Price model SMD/AMD, Metal Aire series 5500
42 or 5500S, and Krueger series S.

43
44 Aluminum (Steel) unless otherwise indicated, louvered face furnished with frame type appropriate to
45 installation.

46
47 Directional blow pattern as shown on the drawings and/or as scheduled.

48
49 One-piece construction louver cones with no corner joints.

50
51 White, baked enamel finish or powder coat finish, unless otherwise indicated.

52
53

SIDE-WALL REGISTERS AND GRILLES

Titus series 300 (supply) and series 350 (return/exhaust), Carnes model R series, Price model 520 (Supply) or 530 (return/exhaust), Metal Aire series V4000 or H4000, Krueger series 880.

Aluminum (Steel) unless otherwise indicated, with frame type appropriate to installation.

Double deflection type blade supply registers and supply grilles allow deflection adjustment in all direction.

Opposed blade volume control damper supply registers, operable from face (OBD volume damper allowed only if specifically called out or approved by Engineer).

Fixed blade (0 degree, 45 degree) core return and exhaust registers and grilles.

Register and grille sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

Screw holes on surface counter sunk to accept recessed type screws.

EGGCRATE GRILLE

Titus model 50, Carnes model RAE or RAT, Price model 80, Metal Aire model CC, Krueger model EGC.

Aluminum construction with frame type appropriate to installation.

Grille face 1/2" x 1/2" or 1" x 1" grid pattern 1" deep with a minimum of 85% free area.

Grille sizes and finishes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated..

Screw holes on surface counter sunk to accept recessed type screws.

HEAVY DUTY SIDE-WALL RETURN/EXHAUST GRILLE

Titus model 30, Carnes Sturdicore, Price 91, Metal Aire series SBG, Krueger series 480, Price model (90, 91, 95, 96 as specified).

Grille border 16-gauge steel and grille blades 14-gauge steel suitable for gymnasium applications.

Fixed blade (0 degree, 45 degree).

Grille sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

DOOR GRILLE

Titus Series 700, Carnes Series RF or RG, Metal Aire Series DG, Price ATG/STG

Aluminum (Steel). Sight tight.

Grille sizes, frame types, and finishes as shown on drawings and/or as scheduled.

1 White, baked enamel finish or powder coat finish, unless otherwise indicated.
2
3
4

5 **PART 3 - EXECUTION**

6
7 **INSTALLATION**

8 Install grilles, registers and diffusers as shown on drawings and according to manufacturer's instructions.
9

10 Furnish diffusers with equalizing grids where it is not possible to maintain minimum 2 duct diameter
11 straight duct into diffuser. Equalizing grids shall consist of individually adjustable vanes designed for
12 equalizing airflow into diffuser neck and providing directional control of airflow.
13

14 Unless otherwise indicated, size ductwork drops to diffusers or grilles to match unit collar size.
15

16 Seal connections between ductwork drops and diffusers/grilles airtight.
17

18 Where diffusers, registers and grilles cannot be installed to avoid seeing inside duct, paint inside of duct
19 with flat black paint to reduce visibility.
20

21
22 **CONSTRUCTION VERIFICATION**

23 Contractor is responsible for utilizing the construction verification checklists supplied under specification
24 Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91
25 01 or 01 91 02.
26

27 **END OF SECTION**
28
29
30

PARTICULATE AIR FILTRATION

PART 1 - GENERAL**SCOPE**

This section includes specifications for air system filters. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Operation and Maintenance Data
- Design Criteria

PART 2 - PRODUCTS

- Manufacturers
- Panel Filters
- MERV 8 Filters
- Housings for Panel Filters
- Housings for MERV 8 Filters
- Side Access Filter Housings

PART 3 - EXECUTION

- Installation
- Filter Gauges
- Construction Verification
- Agency Training

RELATED WORK

- Section 01 91 01 or 01 91 02 – Commissioning Process
- Section 23 07 00 - HVAC Insulation
- Section 23 08 00 – Commissioning of HVAC
- Section 23 73 13 - Modular Indoor Central-Station Air-Handling Units

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ASHRAE Standard 52
- UL 181 – Standard for Factory-Made Air Ducts and Air Connectors
- UL 586 – Standard for High Efficiency Particulate Air Filter Units
- UL 900 – Standard for Air Filter Units

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Include data concerning dimensions, materials, efficiencies, installation instructions and appropriate identification.

Provide the follow-up paragraph or similar when the use of tested media is required. Test reports should be included in the shop drawings.

Independent test reports verifying filter performance, test procedures and ratings.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA

Use UL Class 1 or Class 2 filters unless noted otherwise.(Reference applicable UL standard referenced)

Efficiencies indicated in this section are based on ASHRAE Standard 52.

PARTICULATE AIR FILTRATION

1 Fan motors have been selected to operate against the resistance of dirty filters as specified in this
2 section.

3
4 Minimum filter thickness is 2" for ducted fan systems.

PART 2 - PRODUCTS

MANUFACTURERS

10 Camfil-Farr 30-30, Cambridge, American Air Filter, Eco-Air Products, Flanders, Precisionaire.
11 or approved equal.

PANEL FILTERS (use only where existing to remain or required by equipment)

15 Use 1" (or as scheduled) thick fiberglass blanket enclosed in a cardboard frame and reinforced with a
16 perforated metal retainer on the air leaving side, Coat media with flameproof, non- volatile adhesive.

17
18 Media nominal rating to be 500 FPM face velocity, 0.15 inch WG initial resistance, 0.50 inches WG
19 recommended final resistance. Average arrestance of filter media shall be 80%.

20
21 Provide filter holding frame.

MERV 8 FILTERS

22 Use 2" thick, pleated panels, 100% synthetic, self supported media fully bonded and sealed in cardboard
23 frame.

24 Media nominal rating to be 500 FPM face velocity, 0.20 inch WG initial resistance, 1.0 inches WG
25 recommended final resistance., Average arrestance of filter media shall be 90-92%

26 Furnish a side access housing or holding frame as scheduled.

27 Filter tracks shall be constructed to provide a minimum clearance of 2 inches between the pre-filter and
28 final-filter media to facilitate the installation of static pressure tips.

HOUSINGS FOR PANEL FILTERS

29 Manufactured by air handling unit manufacturer, filter media manufacturer, or contractor fabricated.
30 Casing and tracks constructed of galvanized or enameled steel or aluminum. Provide access to the
31 media tracks from outside the casing so media and be readily changed.

HOUSINGS FOR MERV 8 FILTERS

32 Housing or holding frame to be of the same manufacturer as filter media or provided by the air handling
33 unit manufacturer. Contractor fabricated housings or filter racks will not be accepted. Casing and tracks
34 constructed of galvanized or enameled steel or aluminum. Provide access to the media tracks from
35 outside the casing so media and be readily changed. Filter tracks shall be constructed to provide a
36 minimum clearance of 2 inches between the pre-filter and final-filter media to facilitate the installation of
37 static pressure tips.

SIDE ACCESS FILTER HOUSINGS

38 Galvanized steel housing with aluminum or galvanized steel filter mounting tracks. Mounting tracks and
39 access doors to have gaskets to minimize air bypass around the filters. Housing assembly to be suitable
40 for use in duct systems with 2 inches of water static pressure.

41 Insulate housings where adjacent duct or air handling apparatus is insulated. Insulation to be contained
42 within a 2" thick, double wall steel panel and meet the requirements specified for adjacent duct or
43 apparatus.

44 Furnish a door on each end of the housing to facilitate filter changing. Doors to be hinged and provided
45 with lever handle latches to secure the door. Doors shall not be secured with nuts, bolts, wing nuts, or
46 sheet metal screws.

PART 3 - EXECUTION

PARTICULATE AIR FILTRATION**1 INSTALLATION**

2 Do not use airhandlers for temporary heat without permission from Owner and Engineer. Where air
3 handling equipment is to be used for temporary heating or ventilation of a facility, do not operate the
4 equipment until specified filter media has been installed. Install temporary filters on all return and exhaust
5 grills. Install scheduled filter media in all airhandlers. Contractor shall be responsible for maintaining the
6 cleanliness of air handling apparatus and air distribution systems during construction through regular
7 inspection and changing of filter media throughout the construction period.
8

9 Where air handling apparatus is used during the construction period, install new filter media prior to start
10 of air balancing. Additionally, deliver one new set of media to the owner prior to substantial completion.
11

12 Install units as shown on drawings and details according to manufacturer's instructions.
13

14 Reinforce filter holding frames per manufacturer's instructions.
15

16 Maintain necessary clearance for changing filters.
17

18 CONSTRUCTION VERIFICATION

19 Contractor is responsible for utilizing the construction verification checklists supplied under specification
20 Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91
21 01 or 01 91 02.
22

23
24

END OF SECTION

1 PART 1- GENERAL**2 PERMITS, FEES AND SERVICE CHARGES**

3 The CONTRACTOR shall obtain all electrical permits required to complete the work and pay all associated
4 fees.

5 The CONTRACTOR shall coordinate and provide for the installation and operation of franchise utility service
6 (including any telephone and/or leased lines specified) as required during construction, startup, testing, and
7 operation of the work until substantial completion.

8 CONTRACTOR'S RESPONSIBILITY FOR FIELD VERIFICATION OF EXISTING CONDITIONS

9 The CONTRACTOR shall be responsible for performing field verification of the existing conditions prior to
10 bidding. The nature of this work inherently requires field observation to understand the existing conditions
11 and scope of work.

12 Failure to observe the existing conditions of ignorance of existing conditions shall be the responsibility of the
13 CONTRACTOR alone. Additional services shall not be authorized due to the CONTRACTOR'S lack of
14 understanding on the existing conditions.

15 CONTRACTOR'S RESPONSIBILITY FOR SHUTDOWNS AND MAINTAINING EXISTING SYSTEMS

16 Shutdowns of any Division 26, 27, or 28 system shall be coordinated with the OWNER prior to performing the
17 shutdown. The CONTRACTOR shall provide the OWNER with a written schedule identifying the system,
18 duration, and impact on the OWNER'S facility.

19 Existing Division 26, 27, and 28 systems not impacted by the work in this project shall be protected and
20 maintained during construction. Any system not identified on the Drawings or within these Specifications shall
21 be brought immediately to the attention of the ENGINEER and OWNER.

22 The CONTRACTOR shall be responsible for bearing the cost of repairing or restoring all electrical
23 systems that are disrupted or damaged during construction. The systems shall be repaired and restored
24 to their original condition.

25 INTENT OF DRAWINGS AND SPECIFICATIONS

26 Riser and other diagrams are schematic and are intended to show the approximate location of equipment,
27 and the general alignment of conduits and piping, and shall not be used for obtaining quantities. Dimensions
28 given on the plans shall take precedence over scaled dimensions and all dimensions whether in figures or
29 scaled, shall be verified in the field.

30 The electrical drawings do not show complete details of the site conditions. The CONTRACTOR shall check
31 actual conditions.

32 The exact location of apparatus, fixtures, equipment, conduit and piping shall be ascertained by the
33 CONTRACTOR in the field, and the work shall be laid out accordingly. Should the CONTRACTOR fail to
34 ascertain such locations or coordinate with work performed by other trades, the work shall be changed at no
35 additional cost to the OWNER when so ordered by the ENGINEER. The ENGINEER reserves the right to
36 make minor changes in the location of conduit, piping and equipment up to the time of installation without
37 additional cost to OWNER.

38 CONTRACTOR shall provide all labor, materials, equipment, machinery, and tools necessary to provide all
39 electrical equipment specified and shown on the Drawings. All items not specified in detail or shown on the
40 Drawings but necessary for complete installation shall be provided by the CONTRACTOR.

41 SUBSTITUTION REQUESTS

42 All substitution requests shall meet the following:

43 Shall be received by the ENGINEER no later than ten (10) business days prior to date of final addendum
44 during the bid period. Submittals that do not meet this requirement shall be returned as LATE and shall
45 not be considered for a substitution request.

46 Shall have clearly labeled and marked-up product data, indicating the features and part numbers.
47 Submittals shall be individually labeled with the reference key note number or luminaire identification tag
48 for which the substitution request is being made. Generic product catalog data or unmarked and or

1 unlabeled substitution requests shall not be considered and shall be returned as INCOMPLETE to the
2 CONTRACTOR.

3 All product data identified as OWNER Standard shall not be eligible for a substitution request.

4 **SUBSTITUTION REQUESTS FOR MECHANICAL, HVAC, PROCESS, OR OTHER EQUIPMENT**
5 **IMPACTING THE ELECTRICAL DESIGN**

6 The CONTRACTOR shall be responsible for including the cost impact to the electrical systems for substitution
7 requests and/or value engineering for mechanical, HVAC, process, or other equipment made by other trades.
8 The costs to the overall substitution request or value engineering solution must be included in the total
9 number provided to the OWNER. The CONTRACTOR is responsible for coordinating the substitution
10 requests or value engineering proposals made by other trades.

11 Any substitution request and/or value engineering solution which impacts the electrical design but does not
12 include the costs shall be unacceptable.

13 Failure of other subcontractors to include the electrical cost impact shall not be the basis for a change order.
14 The CONTRACTOR shall be responsible for coordinating the total costs of all substitution requests and/or
15 value engineering solutions prior to presenting them to the ENGINEER or OWNER. When these requests are
16 received by the ENGINEER or OWNER to review and approve, the ENGINEER SUBMITTALS

17 **SUBMITTALS**

18 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
19 rejected as incomplete.

20 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
21 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
22 be rejected as incomplete.

23 A submittal is required for each product specified. Each individual product submittal shall have the
24 corresponding Reference Keynote Number (example - 260000.A01) typewritten in the upper right hand
25 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
26 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
27 be rejected as incomplete.

28 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
29 specifically which components or parts are being submitted for approval. Any product submittals, such as
30 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
31 will be rejected as incomplete.

32 Submittals shall be in accordance with the requirements of these Contract Documents and shall include the
33 following:

34 Submittals shall include information and literature as required for all equipment and materials provided
35 under this and related sections.

36 Shop Drawings: Shop drawings shall include the following along with any special requirements listed in
37 the individual Specification Sections:

38 Installation instructions and drawings

39 Wiring schematics with termination point identification

40 Motor information

41 Materials of construction

42 Manufacturer's name and model

43 Manufacturer's catalog data

44 Supplementary structural framing for electrical equipment including design loads, member size and
45 location. When supplementary framing is indicated, verify that dimensions are suitable for the
46 equipment furnished. Provide additional strength when equipment furnished is heavier than that
47 specified.

1 Manufacturers' Literature: Literature indicating the compliance of the products with the Specifications
2 shall be included with all submittals. This shall include catalogs and other descriptive bulletins. Relevant
3 portions of the literature shall be clearly identified by highlighting or underlining.

4 Test Logs: The CONTRACTOR shall submit test logs as outlined below and as specified in subsequent
5 electrical sections and drawings.

6 A log of the complete results of tests for shorts and grounds for each circuit. All circuits and tests
7 shall be clearly identified.

8 A log of complete results of insulation resistance measurements of each circuit. All circuits and tests
9 shall be clearly identified.

10 Operation and maintenance information for all equipment furnished and/or installed.

11 Programming instructions for any controllers or other programmable equipment. Copies of the any
12 required software, including registration cards, shall be provided with the O&M manuals.

13 Deferred Submittals

14 Submittals for seismic bracing/anchoring and wind loads shall be a deferred submittals. Engineering of
15 the seismic bracing and anchoring system shall be provided by a licensed Engineer in the State of
16 Oregon. Submittals shall include calculations and drawings, including connection types/materials/sizes,
17 load, maximum load, dimensions, etc.

18 The CONTRACTOR shall indicate on the submittals all variances from the Specifications.

19 Record Drawings. After the completion of construction, the CONTRACTOR shall provide one set of "as-built"
20 drawings to the ENGINEER as specified herein showing the location of buried conduits and all changes or
21 deviations from the original drawings.

22 Final inspection certificates shall be submitted prior to final payment.

23 COORDINATION OF WORK

24 The CONTRACTOR shall plan his work in coordination with the other trades and with the power and
25 telephone utility authorities.

26 The CONTRACTOR shall field verify all dimensions of equipment to be installed or provided by others so that
27 correct clearances and connections may be made between the work installed by the CONTRACTOR and
28 equipment installed or provided by others.

29 The CONTRACTOR shall arrange all conduit runs so that they do not interfere with piping, structural
30 members, etc.

31 All working measurements shall be taken from the sites, checked with those shown on the drawings, and if
32 they conflict, reported to the ENGINEER at once, and before proceeding with the work. Should the
33 CONTRACTOR fail to comply with this procedure, he shall alter his work at his own expense as directed by
34 the ENGINEER.

35 No additional payments will be allowed where obstructions in the work of other trades, or work under this
36 contract requires offsets to conduit runs.

37 The CONTRACTOR is responsible for all alterations in the work to accommodate equipment differing in
38 dimensions or other characteristics from that shown or specified.

39 The CONTRACTOR shall provide all temporary power necessary for existing site equipment and for all
40 construction needs.

41 SUPERVISION

42 The CONTRACTOR shall maintain adequate supervision of the work and shall have a responsible person in
43 charge at the site during all times that work under this contract is in progress, or when necessary for
44 coordination with other work.

45 CODES

1 Work shall conform to the National Electrical Code (NEC), and State Codes and other applicable codes, even
2 though not specifically mentioned for each item. These shall be regarded as the minimum standard of quality
3 for materials and workmanship.

4 CONTRACTOR'S RECORD DRAWINGS & AS-BUILTS

5 The CONTRACTOR shall maintain a neatly marked set of record drawings showing the locations of all buried
6 conduits and other utilities encountered or installed during construction. The final locations of panels, field
7 mounted instruments and panels, terminal boxes, junction boxes, receptacles, light switches and other materials
8 included in the work shall be shown, as well as conduit routing between them to the extent it differs from the
9 design drawings. Record drawings shall be kept current with the work as it progresses and shall be subject to
10 inspection by the OWNER's Representative at any time. Failure to keep field record drawings current may result
11 in the issuance of a stop work order or delay in the processing of pay requests until the record drawings are made
12 current.

13 The CONTRACTOR shall provide one complete set of as-built electrical schematics for all panels and
14 equipment provided, including PLC I/O schematics as applicable, panel elementary diagrams, interconnecting
15 wiring diagrams, wire numbers, termination strip locations and numbers. These shall be in the same format and
16 style as those in the Contract Documents and submittal requirements.

17 All information shown on the CONTRACTOR's field record drawings and as-built schematics shall be subject
18 to verification by the OWNER's Representative. If significant errors or deviations are noted by the OWNER's
19 Representative, new as-builts shall be completed at the CONTRACTOR's expense.

20 **PART 2- PRODUCTS**

21 PORTABLE OR DETACHABLE PARTS

22 The CONTRACTOR shall retain in his possession and shall be responsible for all portable and detachable
23 parts or portions of installations such as fuses, key locks, adapters, blocking chips and inserts until completion
24 of his work.

25 These parts shall be delivered to the ENGINEER and an itemized receipt obtained. This receipt, together
26 with 2 copies of the final inspection certificate, shall be attached to the CONTRACTOR's request for final
27 payment.

28 All equipment shall be demonstrated to operate in accordance with the requirements of this specification and
29 the manufacturer's recommendations.

30 NEW PRODUCTS

31 All products shall be new without defects and covered by Manufacturer's warranty. Products shall be re-used
32 only where indicated on the Drawings.

33 All products shall be listed, labeled, and certified by a testing agency approved by the state of Oregon.

34 All equipment of the same type and capacity shall be by the same manufacturer.

35 **PART 3- EXECUTION**

36 IDENTIFICATION

37 All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

38 WORKMANSHIP & COORDINATION

39 All work shall be performed by personnel skilled in the particular trade in a workmanlike manner.
40 Workmanship shall conform to the standards of the NEC and the National Electrical Installation Standards
41 (NEIS).

42 The ENGINEER shall be the sole judge as to whether or not the finished work is satisfactory; and if in his
43 judgment any material or equipment has not been properly installed or finished, the CONTRACTOR shall
44 replace the material or equipment whenever required, and reinstall it in a manner entirely satisfactory to the
45 ENGINEER without any increase in cost to the OWNER.

46 The CONTRACTOR shall coordinate and verify the installation of all equipment furnished by him to other
47 trades, or equipment provided and installed by other trades that is connected to the electrical or control

1 systems. Work shall include the furnishing of all labor, materials, and equipment required for the installation of a
2 complete and operable system as hereinafter specified and as indicated on the drawings. The Contract
3 Documents are complementary and what is called for by any one shall be as binding as if called for by all. Unless
4 otherwise specifically stipulated, the term "furnished and installed complete" shall be considered a part of this
5 section.

6 Controls and systems shall be complete with transformers, switches, relays, contactors, control valves,
7 control devices, instrument piping, fittings, valves, control wiring, thermometers, pressure gauges,
8 thermostats, damper operators, miscellaneous control cabinets to fill the intent of the Specifications and shall
9 provide control for the various units and systems. All control valves and motorized dampers shall be provided
10 with position indicators.

11 Unless otherwise specified or shown on the drawings, switches or relays shall be installed in, or adjacent to
12 the motor starter or other electrical device to which they are to be connected. Control and interlock wiring shall
13 be included as necessary from breakers specified herein or shown on the drawings.

14 Each control schematic intended to control a series of motor operated louvers, fans, and thermostats shall
15 contain a switch for maintenance to meet the NEC requirements regarding disconnect switches for motors.
16 This switch shall be local if any unit controlled is out of sight of the switch. This switch shall disconnect all
17 power to all motor operated devices within the circuit.

18 TEMPORARY HEATING, LIGHTING AND POWER

19 The CONTRACTOR shall provide all heat, lighting and power required to construct and protect the work until
20 the work is placed in service by the OWNER for beneficial use of the OWNER. Temporary heaters shall be
21 provided as required to keep the work area and all new electrical components dry.

22 The source for temporary power shall be from the electric utility or OWNER approved CONTRACTOR
23 supplied auxiliary power units. The installation for electric power shall meet the requirements of local
24 authorities and of OSHA.

25 The CONTRACTOR shall obtain all permits and pay all costs for connecting temporary power service at no
26 expense to the OWNER.

27 SUPPORT BACKING

28 Provide any necessary backing required to properly support all fixtures and equipment installed under this
29 contract.

30 CUTTING, PATCHING AND FRAMING

31 The CONTRACTOR shall determine in advance the locations and sizes of all sleeves, chases, and openings
32 necessary for the proper installation of his work.

33 Whenever practical, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be
34 held to a minimum. All required holes in concrete construction shall be made with a core drill and patched
35 with non-metallic non-shrink grout.

36 Cutting, fitting repairing and finishing of carpentry work, metal work, or concrete work, and the like, which may
37 be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is
38 required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to
39 be cut in floors must be drilled without breaking out around the holes.

40 ACCESS PANELS

41 The CONTRACTOR shall provide all access panels in hard ceilings to allow NEC-required access to junction
42 boxes, pull boxes, and light fixtures. The CONTRACTOR shall submit to the ENGINEER for approval floor
43 plans (1/8" = 1'-0" scale minimum) which clearly indicate proposed access panel locations.

44 TESTS

45 The CONTRACTOR shall furnish all labor, material, instruments and tools to make all connections for testing
46 of the electrical and instrumentation installation. All equipment shall be demonstrated as operating properly
47 prior to the acceptance of the work. All protective devices shall be operative during testing of equipment. The
48 tests shall be made under the supervision of the ENGINEER. All deficiencies or unsatisfactory conditions as

GENERAL ELECTRICAL REQUIREMENTS

26 00 00-6

1 determined by the ENGINEER or inspecting authorities shall be corrected by the CONTRACTOR in a
2 satisfactory manner at his own expense.

3 After visual inspection of joints and connections and the application of tape and other insulating materials, all
4 sections of the entire wiring system shall be thoroughly tested for shorts and grounds. A log of results for
5 each circuit shall be kept by the CONTRACTOR and presented to the ENGINEER.

6 A phase rotation check shall be made to demonstrate that all power receptacles, service feeders, main power
7 feeders and auxiliary power generators have the same A - B - C phase rotation and ground relationships.

8 Equipment shall be tested by operating all electric motors, relays, controls, switches, heaters, etc., sufficiently
9 to demonstrate proper installation and electrical connections. Control and emergency conditions shall be
10 artificially simulated where necessary for complete system or subsystem.

11 CLEANING AND TOUCH-UP PAINT

12 Upon completion of work, all electrical equipment shall be cleaned.

13 Vacuum all dirt, metal shavings, and foreign materials from all enclosures. The use of compressed air
14 shall not be acceptable.

15 All stains, dirt, and fingerprints shall be removed from switchboards, motor control centers, panelboards,
16 light fixtures, enclosures, and all other electrical equipment covers.

17 Provide touch-up paint on equipment that has been scraped, scratched, or chipped during construction. Paint
18 color shall match color of equipment.

19 COORDINATION OF STARTUP AND ADJUSTING, COMMISSIONING, DEMONSTRATION AND 20 TRAINING, AND OPERATION AND MAINTENANCE DATA.

21 Reference 260110 - Operation and Maintenance Data, and 260115 - Demonstration and Training, for detailed
22 requirements.

23

24

END OF SECTION

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes:

4 Definitions.

5 General requirements.

6 Submittal procedures.

7 Content requirements for manuals.

8 Supplements.

9 **DEFINITIONS**

10 Maintenance Operation.

11 Routine operation required to ensure satisfactory performance and longevity of the equipment. Examples
12 of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands and
13 other routine adjustments.

14 **GENERAL REQUIREMENTS**

15 Provide operation and maintenance data for items listed in Supplement 260110 – A, “Schedule of Equipment
16 Requiring Operation and Maintenance Data”.

17 In addition to the composite of manuals for individual equipment items or systems, provide a consolidated
18 summary of required routine scheduled maintenance and scheduled preventative and predictive maintenance
19 for the project, with reference to where detailed information may be found. Include safety information and
20 emergency plans and procedures. The summary shall be in a separate binder from the other equipment and
21 system binders.

22 Comply with the following format relating to the Operation and Maintenance Manual:

23 All binders shall be “D” ring type with one-touch ring locking mechanism.

24 Overlay material shall be crystal clear poly.

25 Binders shall be black poly.

26 Binders shall be nominally sized for 75 percent fill per volume with a maximum binder depth of four (4)
27 inches and a minimum depth of one (1) inch.

28 Submit example binder cover sheet for approval by ENGINEER.

29 Submit example spine insert for approval by ENGINEER.

30 Paper: twenty (20) pound minimum, white for typed pages, 8.5 x 11 inches.

31 Text: Manufacturer’s printed data, or neatly typewritten. Facsimiles transmitted via fax machine shall be
32 unacceptable.

33 Three-hole punch data for binding and composition; arrange printing so that punched holes do not
34 obliterate data.

35 Provide fly-leaf for each separate product, or each piece of operating equipment, with typed description of
36 product and major component parts of equipment. Provide with heavy section dividers with numbered
37 plastic index tabs.

38 Provide each manual with a title page, typed table of contents with consecutive page numbers. Plan
39 contents of entire set, identified by volume number, in each binder.

40 Material shall be suitable for reproduction with quality equal to the original. Photocopying of material will
41 be acceptable except for material containing photographs.

42 Table of contents shall be neatly typewritten, arranged in a systematic order, containing as a minimum
43 the following data:

44 CONTRACTOR, name of responsible principle, address and telephone number.

- 1 List of each product required to be included and indexed to content of each volume.
- 2 List of each product, name, address and telephone number of subcontractor, supplier, installer and
- 3 maintenance contractor as appropriate.
- 4 Provide local source and phone number of supply for parts and replacement.
- 5 Identify each product by product name, model number and other identifying numbers or symbols as
- 6 set forth in the Contract Documents.
- 7 Product data:
- 8 Include only those sheets that are pertinent to the specific product provided.
- 9 Clearly annotate each sheet to identify specific product or part installed, data applicable to the
- 10 installation and delete references to inapplicable information.
- 11 Drawings; supplement product data with drawings as necessary to clearly illustrate the following:
- 12 Relationship of component parts of equipment and systems.
- 13 Control and flow diagrams.
- 14 Coordinate drawings with project record documents to assure correct illustration of completed
- 15 installations.
- 16 CONTRACTOR shall not use project record documents as maintenance manual drawings.
- 17 Provide reinforced punched binder tabs.
- 18 Reduced 11 x 17 inch drawings shall be folded to 8.5 x 11 inch format.
- 19 Where reduction to 11 x 17 inch is impractical, fold and place the 8.5 x 11 inch envelopes that are
- 20 bound in the binder.
- 21 Identify specification Section and product on drawings and envelopes.
- 22 **SUBMITTAL PROCEDURE**
- 23 Compile the required data, arrange as specified herein and insert data in the number of volumes necessary.
- 24 The volumes shall be submitted as a complete set. Partial or incomplete manuals shall be rejected by the
- 25 ENGINEER.
- 26 Preliminary Manuals:
- 27 Submit three copies to ENGINEER for review and approval well before the starting and adjusting
- 28 activities commence.
- 29 If accepted:
- 30 One copy will be returned to the CONTRACTOR.
- 31 One copy will be forwarded to the OWNER.
- 32 One copy will be retained in the ENGINEER's file.
- 33 If rejected:
- 34 Two copies will be returned to the CONTRACTOR with ENGINEER's comments for revision.
- 35 One copy will be retained in the ENGINEER's file.
- 36 CONTRACTOR shall be required to resubmit three revised preliminary manuals for ENGINEER's
- 37 review.
- 38 Final Manuals:
- 39 Submit two copies to ENGINEER for review and approval before final completion.
- 40 If accepted:
- 41 CONTRACTOR will be so notified.

1 CONTRACTOR shall provide a complete set of the final manual on CD-ROM. Data written specifically
2 for the manual will be presented in MS Word format. Manufacturer data (per-printed data) will be
3 presented in Adobe PDF format.

4 If rejected:

5 At the ENGINEER's discretion either all but one copy of the manuals will be returned to the
6 CONTRACTOR for revisions or all copies will be retained by the ENGINEER and the necessary
7 revision data will be requested from the CONTRACTOR.

8 **CONTENT REQUIREMENTS FOR MANUALS**

9 The Operation and Maintenance Manuals shall normally consist of no less than four volumes outline below.

10 Volume 1 – Facility Overview.

11 All sheets in volume 1 shall have sheet protectors.

12 All materials in volume 1 shall be copied onto a CD and provided to the ENGINEER.

13 Include instructions and procedures for handling, storage, maintenance during storage, assembly,
14 erection, installation, adjusting, testing, operating, shut down in emergency, troubleshooting,
15 maintenance, interface with other equipment and as may otherwise be required.

16 Organize in a consistent format under separate heading for each different procedure.

17 Provide a logical sequence of instructions for each procedure.

18 Provide an information sheet for the OWNER's personnel which include the proper procedures in the
19 event of a failure and instances that might affect the validity of warranties or bonds.

20 Content for each unit (or common units) and system:

21 Description of unit and component parts including controls, accessories and appurtenances. Detail
22 their function, normal operating characteristics and limiting conditions. Provide performance curves,
23 engineering data, nameplates data and test forms. Provide a complete commercial number and
24 nomenclature for replaceable parts.

25 Operating Procedures:

26 Start-up and break-in routine and normal operating instructions.

27 Test procedures and results of factory tests where required.

28 Regulation, control, stopping and emergency instructions.

29 Description of operation sequence by control manufacturer.

30 Shutdown instructions for both short and extended durations.

31 Summer and winter operating instructions as applicable.

32 Maintenance and Overhaul Procedures:

33 Routine operations

34 Guide to troubleshooting.

35 Disassembly, removal, repair, reinstallation and reassembly.

36 Installation Instructions including alignment, adjusting, calibrating and checking.

37 Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part
38 numbers and sequentially numbered parts list and diagrams required for maintenance.

39 Parts list by generic title and manufacturer's part number.

40 Name, location and telephone number of nearest supplier and spare parts warehouse.

41 Where applicable identify installed spares and other provisions for future work (e.g. reserved panel space,
42 unused components, wiring and terminals).

- 1 Manufacturer's printed operating and maintenance instructions.
- 2 Charts of valve tag numbers along with the location and function of each valve.
- 3 Manufacturer's certifications including calibration data sheets and specified calibration procedures or
- 4 methods for installed equipment.
- 5 Warranty forms and information for all installed equipment provided by the CONTRACTOR.
- 6 Circuit directories for all panels including electrical, control and communication.
- 7 List of adjustable electrical relay settings, control and alarm settings.
- 8 Volume 2 – Equipment Manuals.
- 9 Table of contents shall have a sheet protector
- 10 Table of contents and index sheets shall be of colored card stock.
- 11 Manuals for individual equipment shall not be divided between separate binders.
- 12 List function, normal operation, characteristics and limiting conditions.
- 13 Complete commercial part number and nomenclature of replaceable parts.
- 14 Maintenance procedures including routine operations, guide to troubleshooting and adjustments.
- 15 Manufacturer's printed operation and maintenance instructions.
- 16 List of manufacturer's spare parts and recommended quantities to be maintained in storage.
- 17 Contents for Maintenance Summary Manual:
 - 18 Compile individual maintenance summaries for each applicable equipment item, respective unit or
 - 19 system and for components or subunits.
 - 20 Format shall include use of the Supplement 260110 – B "Maintenance Summary" provided. Each
 - 21 Maintenance Summary may take as many pages as required. Supplement shall be typewritten and
 - 22 shall include detailed lubrication instructions and diagrams showing points to be greased or oiled,
 - 23 recommended type, grade and temperature range of lubricants and frequency of lubrication.
 - 24 Include a list and quantity of manufacturer's recommended consumable and spare parts that should
 - 25 be stored on site.
- 26 Volume 3 – Drawings
 - 27 As-built drawings associated with the project shall be provided. This includes, but is not limited to,
 - 28 manufacturers supplied drawings. All drawings shall be provided on 11 x 17 inch sheets folded to 8.5 x 11
 - 29 inch size and bound in this volume. A complete and detailed index shall be provided that includes a list of
 - 30 all drawings in the volume and the drawings shall be tabbed in a fashion that provides clear and concise
 - 31 identification.

32 **PART 2- PRODUCTS – NOT USED**

33 **PART 3- EXECUTION**

34 SUPPLEMENTS

35 Supplement 260110 – A, "Schedule of Equipment Requiring Operation and Maintenance Data".

36 END OF SECTION

37

OPERATION AND MAINTENANCE DATA

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1
2
3

Supplement 260110 – A
Schedule of Equipment Requiring Operation and Maintenance Data

Item No.	Section	Manual (M) Data Sheet (D)	Description
1.	260933	D	Wireless Lighting Control System
2.	265100	D	Interior Lighting

4
5

END OF SUPPLEMENT

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes.

4 Removal of existing electrical equipment, wiring and conduit in areas to be remodeled. Removal of
5 designated construction, dismantling, cutting and alterations for completion of the Work.

6 Disposal of materials.

7 Storage of removed materials.

8 Closeout Submittals

9 Refer to the Contract Documents for general closeout submittal requirements.

10 Project Record Drawings shall be provided that record actual locations of capped conduits and equipment
11 abandoned in place.

12 Sequencing

13 Sequencing of the Work shall be as noted in Contract Documents.

14 Scheduling

15 Refer to the Contract Documents.

16 Coordinate the schedule of noisy, malodorous, and dusty work with the ENGINEER.

17 Coordination

18 Refer to the Contract Documents.

19 Conduct demolition to minimize interference with adjacent or occupied spaces.

20 Coordinate demolition work with other trades.

21 Coordinate and sequence demolition so as not to cause shutdown or interruption of operation of
22 surrounding areas.

23 Arrange timing of shutdowns with the OWNER. Do not shutdown any utility service without prior written
24 approval. Keep shutdown periods to a minimum.

25 **PART 2- PRODUCTS**

26 NOT USED

27 **PART 3- EXECUTION**

28 GENERAL

29 Examination

30 Verify wiring and equipment scheduled for demolition serve only abandoned process and facilities.

31 Verify termination points for demolished services.

32 Demolition

33 Items scheduled for demolition shall be legally disposed of by the CONTRACTOR.

34 Remove exposed abandoned conduit.

35 Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

36 Reconnect equipment being disturbed by renovation work and required for continued service.

37 Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures,
38 equipment, switches, receptacles, conduit, and conductors which are not part of the completed project.

39 Install temporary wiring and connections necessary to maintain existing systems in service during
40 construction.

- 1 Remove, relocate, and extend existing installations to accommodate new construction.
- 2 Repair adjacent construction and finishes to original condition that are damaged during demolition and
- 3 extension work.
- 4 Remove abandoned grounding and bonding components, fasteners, supports and electrical identification
- 5 components. Cut embedded support elements flush with wall, floors and ceilings.
- 6 Provide watertight knockout seals in panels, enclosures, gutters, or junction boxes where conduit is
- 7 removed.
- 8 Clean and repair existing equipment scheduled to be reinstalled.
- 9 Protect and retain power to existing active equipment remaining.
- 10 Cap abandoned empty conduit at both ends.
- 11 Wall, Floor and Ceiling Penetrations
- 12 Seal concrete penetrations originally occupied by removed conduit with suitable grout material. Paint to
- 13 match existing concrete.
- 14 Repair holes in plaster or drywall assemblies. Provide all sheet rock, drywall, joint compound, sanding,
- 15 etc. to repair the assembly to original condition. Paint to match existing assembly.
- 16 Firestopping
- 17 Where existing firestopping sealants, pillows, or other material are removed to facilitate the installation of
- 18 new cabling, the firestopping shall be restored to a Code-compliant installation. All fire rated penetrations
- 19 shall be fully sealed upon completion of work, regardless of the state of the existing installation.
- 20 Reusable Electrical Equipment
- 21 Unless specifically identified for reuse, no used electrical equipment, conduit, conductors, components of
- 22 any sort scheduled for demolition, disposal or salvage shall be installed for reuse on the project.
- 23 Schedules
- 24 Dispose of the following equipment and its associated component.
- 25 All electrical systems identified as demolition.
- 26
- 27

END OF SECTION

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes.

4 The section includes the requirements for conductors and cables used to conduct potentials of 600 volts
5 and less.

6 All conductors and cables shall be installed in conduit or approved raceways regardless of which Division
7 the conductors or cables are specified.

8 REFERENCES

9 The following is a list of Standards which may be referenced in the Section.

10 American Society for Testing and Materials (ASTM).

11 B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or
12 Soft.

13 National Electrical Contractors Association, Inc. (NECA): National Electrical Installation Standards (NEIS).

14 National Electrical Manufacturers Association (NEMA).

15 WC 3, Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

16 WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical
17 Energy.

18 WC 7, Cross Linked-Thermosetting Polyethylene Wire and Cable for the Transmission and
19 Distribution of Electrical Energy.

20 WC 55, Instrumentation Cables and Thermocouple Wire.

21 National Fire Protection Association (NFPA). 70, National Electrical Code (NEC).

22 Underwriters Laboratories, Inc. (UL).

23 13, Standard for Power-Limited Circuit Cables.

24 44, Standard for Safety Rubber-Insulated Wires and Cables.

25 62, Standard for Safety Flexible Cord and Fixture Wire.

26 510, Standard for Safety Insulating Tape.

27 854, Standard for Safety Service-Entrance Cables.

28 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical
29 Fiber Cables Used in Air Handling Spaces.

30 1277, Standard for Safety Electrical Power and Control Tray Cables.

31 1581, Standard for Safety References for Electrical Wires, Cables and Flexible Cords.

32 SUBMITTALS

33 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
34 rejected as incomplete.

35 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
36 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
37 be rejected as incomplete.

38 A submittal is required for each product specified. Each individual product submittal shall have the
39 corresponding Reference Keynote Number (example - 260519.C01) typewritten in the upper right hand
40 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
41 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
42 be rejected as incomplete.

43 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify

1 specifically which components or parts are being submitted for approval. Any product submittals, such as
2 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
3 will be rejected as incomplete.

4 Product Data.

5 Pursuant to Section 013300 Submittal Procedures.

6 Manufacturer's data including materials of construction, weight, and related information for each item
7 specified in PART 2 PRODUCTS.

8 **PART 2- PRODUCTS**

9 MATERIALS

10 **Single Copper Conductors (260519.C01).**

11 Conductors shall be rated for 600 volts and conform to applicable requirements of NEMA.

12 Conductors shall be stranded copper.

13 Insulation type shall be THWN-2.

14 Conductors shall be sized per the Drawings and the NEC, whichever is greater.

15 Rome Cable Corporation, Southwire Company, Okonite Company, or approved equal.

16 **Metal Clad (MC) Type Cable (260519.C25)**

17 Conductors shall be solid copper.

18 Insulation type shall be THHN/THWN.

19 Armor material shall be aluminum.

20 Southwire, or approved equal.

21 ACCESSORIES

22 **Cable Ties (260519.T05).**

23 Cable ties shall be nylon, adjustable, self-locking, and properly sized for the bundle and force implied.

24 Thomas and Betts, Panduit, or approved equal.

25 **Pulling Compound (260519.P01).**

26 Pulling compound shall be non-corrosive, noncombustible, nonflammable waxed based lubricant listed for
27 this use.

28 Ideal Company, Polywater, Inc., or approved equal.

29 **PART 3- EXECUTION**

30 INSTALLATION

31 General:

32 Refer to Section 260533 Raceways and Boxes for Electrical Systems, Part 3 for approved uses of MC
33 type cable.

34 All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

35 Conductor and cable installations shall meet or exceed the NECA National Electrical Installation
36 Standards.

37 CONTRACTOR shall not exceed the manufacturer's recommendations for maximum pulling tensions or
38 minimum bending radii for respective conductors or cables.

39 Pulling compound is recommended for all conductor or cable installations and shall be used on all
40 installations requiring a mechanical pulling device.

41 CONTRACTOR shall furnish and use a dynamometer on all conductor or cable installations requiring the

1 use of a mechanical pulling device. The dynamometer shall be used to verify the maximum pulling
2 tensions are not exceeded. Should the pulling tensions be exceeded, the conductor or cable shall be
3 removed from the raceway and discarded. It shall not be reused under any circumstance on the project.
4 The CONTRACTOR shall be responsible to make the alterations necessary before attempting to re-pull
5 new conductors or cables.

6 Immediately after pulling in conductors or cables, the pulling compound shall be completely removed from
7 the conductors or cables, from boxes, enclosures, floors, walls, etc.

8 Conductor and cable installations shall be continuous without splices or intermediate terminations unless
9 specifically identified on the Drawings or prior written approval from the ENGINEER.

10 Where conductors or cables are routed in boxes enclosures or cable tray they shall be neatly bundled
11 with cable ties at intervals not to exceed 12 inches on center. The tension for the cable ties shall be set
12 with a tool specifically manufactured for that purpose and of the same manufacturer as the cable tie. Side
13 cutters, linemen pliers and similar tools shall not be used to cut the tail end of the cable tie. The
14 CONTRACTOR shall only use the tool specifically manufactured for this purpose and of the same
15 manufacturer as the cable tie.

16 Conductors and cables shall not be installed until the raceway, boxes, enclosures, conduit bushings, etc.
17 have all been installed. Where conductors or cables have been installed prior to meeting this requirement,
18 the ENGINEER shall at their discretion elect to have the conductors or cables removed, disposed of and
19 replaced with new product.

20 Should the outer jacket of any conductor or cable be damaged in any way, they shall be removed,
21 disposed of and replaced with new product.

22 An equipment grounding conductor shall be installed in all raceways. Size shall be as identified on the
23 Drawings or the NEC, whichever is greater, but in no case shall it be less than # 16 AWG for under 50
24 volts and no less than # 14 for 50 volts or above.

25

26

END OF SECTION

1 **PART 1- GENERAL**

2 SECTION INCLUDES:

3 This section includes requirements pertaining to electrical equipment anchoring and electrical equipment
4 hanging and support.

5 **SUBMITTALS**

6 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
7 rejected as incomplete.

8 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
9 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
10 be rejected as incomplete.

11 A submittal is required for each product specified. Each individual product submittal shall have the
12 corresponding Reference Keynote Number (example - 260529.H01) typewritten in the upper right hand
13 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
14 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
15 be rejected as incomplete.

16 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
17 specifically which components or parts are being submitted for approval. Any product submittals, such as
18 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
19 will be rejected as incomplete.

20 **Product Data.**

21 Pursuant to Section 013300 Submittal Procedures.

22 Manufacturer's data including materials of construction, equipment weight and related information for
23 each item specified in PART 2 PRODUCTS.

24 Seismic calculations and drawings.

25 **PART 2- PRODUCTS**

26 **MATERIALS**

27 **Hot Dipped Galvanized Hardware (260529.H11).**

28 Bolts shall be hot dipped galvanized steel and sized for the load served and have a hex head unless
29 specifically specified otherwise elsewhere.

30 Nuts shall be hot dipped galvanized steel hex nut.

31 Washers shall be hot dipped galvanized steel, USS pattern flat washers.

32 Split lock washers shall be hot dipped galvanized steel.

33 Threaded rods and couplings shall be hot dipped galvanized steel.

34 Eye-bolts, u-bolts, bent-bolts and similar connecting hardware shall be hot dipped galvanized steel.

35 **Galvanized Hardware (260529.H12).**

36 Shall be similar to 260529.H11, except finish shall be regular galvanized in lieu of hot dipped galvanized.

37 **Hot Dipped Galvanized Anchors (260529.A11).**

38 Wedge or stud anchors installed in concrete or masonry shall be hot dipped galvanized steel and sized
39 for the load served.

40 Toggle type fasteners shall only be used in hollow sheetrock wall. The wing part of the fastener may be
41 mild steel, but the bolt shall be hot dipped galvanized steel.

42 **Galvanized Anchors (260529.A12).**

- 1 Shall be similar to 260529.A11, except finish shall be regular galvanized in lieu of hot dipped galvanized.
- 2 Hot Dipped Galvanized Beam Clamps (260529.B11).
- 3 Beam clamps shall be hot dipped galvanized steel and sized for the load served.
- 4 Galvanized Beam Clamps (260529.B12).
- 5 Beam clamps shall be regular galvanized and sized for the load served.
- 6 Hot Dipped Galvanized Strut Channel (260529.S01).
- 7 Galvanized strut channel shall be hot dipped galvanized after fabrication and shall be a minimum of 12
- 8 gauge.
- 9 Galvanized strut channel shall have factory pre-drilled holes.
- 10 Galvanized Strut Channel (260529.S02).
- 11 Shall be similar to 260529.S01, except finish shall be regular galvanized in lieu of hot dipped galvanized.
- 12 SEISMIC BRACING
- 13 Seismic Anchoring and Bracing Products (260529.S90).
- 14 Provide seismic bracing for the vertical and lateral restraint of all conduits, conduit racks, raceways, cable
- 15 trays, required by the International Building Code and Oregon Structural Specialty Code.
- 16 **PART 3- EXECUTION**
- 17 INSTALLATION
- 18 General.
- 19 Hardware shall be set to a torque as recommended by the manufacturer.
- 20 Washers and split lock washers shall be installed on all bolts, threaded rods and anchors.
- 21 Lead or plastic type anchors are prohibited from use on the project.
- 22 When threaded rods are installed in drop-in type anchors, a washer, split lock washer and a jamb nut
- 23 shall be installed at the anchor to ensure stability.
- 24 When channel (strut) is installed as a hanger or support from threaded rod, washers, split lock washers
- 25 and jamb nuts shall be installed on both sides of the strut to lock it in place.
- 26 Cut ends of channel, strut, threaded rods or other cut fittings shall be filed smooth before installation.
- 27 Cut ends of hot dipped galvanized channel and strut shall be coated with three coats of cold galvanizing
- 28 compound after the channel has been filed to prohibit rust.
- 29 Concrete anchors shall be installed as per the manufacturer's directions and set using the manufacturer's
- 30 supplied tool.
- 31 Threaded rod shall not extend more than one (1) inch beyond the channel, strut or other material it is
- 32 supporting.
- 33 Hangers and supports shall be installed level and plumb.
- 34 Hangers and supports shall be installed per the National Electrical Code, Building Code and Structural
- 35 Code and shall be designed to safely support the load. The ENGINEER may request the CONTRACTOR
- 36 provide a copy of their design calculations for the seismic requirements and the load served.
- 37 Indoor and Outdoor Installation
- 38 Hot dipped galvanized products shall be used in all outdoor locations.
- 39 Regular galvanized products shall be used in all indoor locations.
- 40 Seismic Anchoring and Bracing

- 1 The design of the seismic anchoring and bracing system shall be by a licensed Structural Engineer in the
- 2 State of Oregon. The CONTRACTOR shall arrange and pay for the services of the licensed Engineer.
- 3 Wet stamped and signed calculations and drawing of the seismic anchoring and bracing system shall be
- 4 submitted to the Architect and Engineer for review and approval.

5
6

END OF SECTION 26 05 29

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes

4 The Section includes the requirements pertaining to conduits and fittings used to contain electrical
5 conductors and cables.

6 All conductors and cables shall be installed in conduit or approved raceways regardless of which Division
7 the conductors or cables are specified.

8 REFERENCES

9 The following is a list of standards which may be referenced in this Section.

10 American National Standards Institute (ANSI).

11 C80.1, Rigid Steel Conduit-Zinc Coated.

12 American Society for Testing Materials (ASTM).

13 A123 E1, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.

14 National Electrical Contractors Association (NECA).

15 National Electrical Installation Standards (NEIS).

16 National Electrical Manufacturers Association (NEMA).

17 TC 3, PVC Fittings for use with Rigid PVC Conduit and Tubing.

18 TC 6, PVC and ABS plastic Utilities Duct for Underground Installation.

19 Nation Fire Protection Association (NFPA).

20 70, National Electrical Code (NEC).

21 Underwriters Laboratories, Inc. (UL).

22 6, Standard for Safety Rigid Metal Conduit.

23 514B, Standards for Safety Fittings for Conduit and Outlet Boxes.

24 651, Standard for Safety Schedule 40 and 80 PVC Conduit.

25 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPE Conduit.

26 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

27 360, Standard for Safety Liquid-Tight Flexible Metallic Conduit.

28 797, Standard for Safety Electrical Metallic Conduit.

29 SUBMITTALS

30 Product data

31 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
32 rejected as incomplete.

33 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
34 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
35 be rejected as incomplete.

36 A submittal is required for each product specified. Each individual product submittal shall have the
37 corresponding Reference Keynote Number (example - 260533.S01) typewritten in the upper right hand
38 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
39 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
40 be rejected as incomplete.

41 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify

1 specifically which components or parts are being submitted for approval. Any product submittals, such as
2 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
3 will be rejected as incomplete.

4 Pursuant to Section 013300 Submittal Procedures.

5 Manufacturer's data including materials of construction, equipment weight and related information for
6 each item specified in PART 2 PRODUCTS.

7 **PART 2- PRODUCTS**

8 MATERIALS

9 **EMT Conduit (260533.C50).**

10 EMT conduit may be used in all indoor and outdoor locations. In outdoor locations the fittings shall be
11 watertight compression fittings. Set screw fittings shall be acceptable in indoor locations.

12 Conduit connectors shall have insulated throats, plastic bushings or ground bushing installed.

13 **Galvanized Sheet Metal Boxes (260533.B15).**

14 Shall comply with NEMA specifications for sheet metal boxes.

15 All boxes shall be deep. No shallow boxes shall be permitted.

16 Shall be 4-11/16" x 4-11/16" x 2-1/8".

17 Provide mud rings or industrial covers for the devices installed and a depth to match the sheetrock where
18 applicable.

19 ACCESSORIES

20 **Firestopping (260533.F90)**

21 Shall be as specified in Division 07 Specifications.

22 Shall be Listed for the conduit, raceway or box being installed.

23 Install per the Manufacturer's instructions.

24 **PART 3- EXECUTION**

25 INSTALLATION

26 **General Requirements**

27 Install conduit runs in accordance with the schematic representation shown on the Drawings.

28 Minimum conduit size shall be .75 inch unless specifically called out otherwise on the drawings.

29 Where raceways are indicated, but the routing is not identified, the routing shall be the CONTRACTOR'S
30 choice and in accordance with the rest of the Contract Documents and the National Electrical Code
31 (NEC).

32 Raceways shall be electrically and mechanically complete before the conductors are installed.

33 Routing of conduits may be adjusted to avoid obstructions. Coordinate with other trades prior to
34 installation of raceways. Lack of such coordination shall not be justification for extra compensation and
35 removal and reinstallation to resolve conflicts shall be at the CONTRACTOR's expense.

36 Conduit joints shall be wrench tight, thoroughly grounded, secure and free of obstructions.

37 Conduits shall be reamed.

38 Exposed conduits shall be installed parallel or perpendicular to the structural members and surfaces and
39 shall be level and or plumb.

40 When two or more conduits are routed in the same general direction their routing shall be parallel with
41 symmetrical bends.

42 Conduits shall be bent with equipment specifically designed for this purpose and for the specific size and

- 1 type of conduit.
- 2 Conduits that are creased or crushed shall be replaced.
- 3 Metallic threads shall all be coated with conduit thread lubricant before assembly. Failure to install the
- 4 lubricant will result in removal of all conduit and reassembly with the conduit lubricant.
- 5 Install conduits such that they do not interfere with the proper and safe operation of equipment and do not
- 6 block or otherwise interfere with the ingress and egress and installation of removable hatches and covers.
- 7 Install expansion joints as needed across expansion joints in the structure and at other locations where
- 8 necessary to compensate for thermal or mechanical expansion or contraction.
- 9 Conduits shall be routed at least six (6) inches from high temperature piping, ducts and flues.
- 10 Final connections to equipment requiring a flexible connection shall be made with LFSC conduit. Lengths
- 11 shall not exceed three (3) feet.
- 12 All conduits shall be capped throughout construction to prevent entrance of dirt, trash, water, etc.
- 13 **EMT and MC Cable Use**
- 14 MC cable shall be permitted in all concealed areas, above ceilings and in walls. EMT conduit shall be
- 15 required in all other locations, including but not limited to, exposed areas and surface installations.
- 16 **Boxes**
- 17 Install boxes and enclosures in accordance with the schematic representation as indicated on the
- 18 Drawings.
- 19 Boxes and enclosures shall be mounted level and plumb.
- 20 Boxes and enclosures shall not be altered, holes drilled, etc. in any way that may compromise the NEMA
- 21 rating of the enclosure or box.
- 22 Boxes and enclosures shall be bonded the equipment grounding conductor.
- 23 Enclosures shall be provided whenever a junction or pull box larger than 4 inches square is required.
- 24 Sheet metal boxes are permitted only in locations where EMT conduit is approved.
- 25 Enclosures shall be labeled with a nameplate as specified in Section 26 05 53 – Identification for
- 26 Electrical Systems. The nameplate shall match the callout on the Drawings. If no callout exists, the
- 27 CONTRACTOR is responsible to meet with the ENGINEER and develop a list of pull box, junction box
- 28 and termination box nomenclature and their as-built Drawings shall reflect these callouts.

29

30

END OF SECTION

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes

4 Requirements for identification of electrical, safety, measurement, data, fire alarm, security, monitoring,
5 control and related components and equipment.

6 SUBMITTALS

7 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
8 rejected as incomplete.

9 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
10 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
11 be rejected as incomplete.

12 A submittal is required for each product specified. Each individual product submittal shall have the
13 corresponding Reference Keynote Number (example - 260553.S21) typewritten in the upper right hand
14 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
15 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
16 be rejected as incomplete.

17 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
18 specifically which components or parts are being submitted for approval. Any product submittals, such as
19 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
20 will be rejected as incomplete.

21 Product Data

22 Pursuant to Section 013300 – Submittal Procedures.

23 The initial submittal shall contain all the products, samples and data base specified. An initial submittal
24 that does not contain all the specified data shall be returned as incomplete.

25 Samples

26 Provide a sample of each type and size of nameplate, label, tag and means of attachment specified for
27 approval by the OWNER.

28 Quality Assurance / Quality Control Submittals

29 The CONTRACTOR shall be responsible for submitting a data base of all identification nameplates,
30 labels, panel schedules and tags required for the Work. The data base shall be developed in the most
31 current edition of Microsoft Excel for the OWNER's future use.

32 Closeout Submittals

33 Pursuant to Section 017800 – Closeout Submittals.

34 **PART 2- PRODUCTS**

35 MATERIALS

36 **Conductor and Cable Identification Sleeves (260553.T31).**

37 The identification sleeves shall be properly sized for the cable or conductor.

38 Shall be adhesive style.

39 Sleeves shall be white with black machine generated characters.

40 Provide Brady wire and cable sleeves, or approved equal.

41 **Flexible Identification Tape (260533.T56).**

42 Shall be white or red with black characters.

43 Standard tape size shall be 0.5 inch high unless specified otherwise and shall have extra strength
44 adhesive rated for indoor and outdoor use.

1 Provide products manufactured by Brother or approved equal.

2 **Conductor Color Coding (260553.C89).**

3 Conductors shall be colored as specified in the table below. The technical specification requirements for
4 the conductors are specified elsewhere.

5

6

Conductor Color Coding

System	Conductor	Color	
All Systems	Equipment Grounding	Green	
IT / Data	Data Cable Sheath (outer cover)	Reference Division 27	
24 Volt DC	Positive	Blue	
	Negative	White w/Blue Stripe	
24 Volt AC	Discrete Input Line (hot leg) Side	Blue	
	Discrete Input Switch Leg	Blue w/White Stripe	
	Discrete Output Line (hot leg) Side	Blue	
	Discrete Output Switch Leg	Blue w/Orange Stripe	
	Hot Leg	Red	
	Neutral	White	
	Discrete Input Line (hot leg) Side	Red	
	Discrete Input Switch Leg	Red w/Blue Stripe	
120 Volt AC Control	Hot Leg	Red	
	Neutral	White	
	Discrete Input Line (hot leg) Side	Red	
	Discrete Input Switch Leg	Red w/White Stripe	
	Discrete Output Line (hot leg) Side	Red	
120/240 Volt Single Phase	Discrete Output Switch Leg	Red w/Orange Stripe	
	Hot Leg # 1	Black	
	Hot Leg # 2	Red	
	Neutral	White	
120/208 Volt Three Phase	Phase A	Black	
	Phase B	Red	
	Phase C	Blue	
	Neutral	White	
120, 208, 277 Volt	Switch Legs	Pink	
480 Volt Three Phase	Phase A	Brown	
	Wye or Delta Corner Tap	Phase B	Orange
	Phase C	Yellow	
	Neutral	Gray	
120/240 Delta Three Phase	Phase A	Brown	

System	Conductor	Color
	Phase B	Orange
	Phase C	Yellow
	Neutral	Gray

1

2 **PART 3- EXECUTION**3 **INSTALLATION**4 **Conductor and Cable Identification Sleeves**

5 Provide adhesive, machine generated, white labels with black characters for all cables and conductors.
6 Explanation is provided below on how various systems shall be identified. In many cases the information
7 necessary to develop the unique identification labels will be provided on the Contract Drawings. The
8 verbiage required for the identification shall be as identified on the Contract Drawings. The
9 CONTRACTOR shall request the required verbiage from the ENGINEER should it not be available or
10 clear based on the information provided on the Contract Drawings.

11 The labels shall be installed between 6 to 8 inches from the end. Conductors shall be labeled at all
12 splices and points of termination.

13 Power conductors and cables, including the neutral and the ground conductors shall all be identified
14 individually. The identification label will be developed as follows: The first set of characters will be the
15 equipment code identifying the source of power "PNL208" followed by the circuit number "CKT 12". For
16 example, the label would read "PNL208-CKT 12".

17 **Device and Faceplate Identification Labels**

18 Devices, faceplates, small electrical boxes 4 inches or less located indoors and similar equipment shall
19 be identified utilizing flexible identification tape. Typically the CONTRACTOR shall provide machine
20 generated, white labels with black characters except as specified otherwise. Explanation is provided
21 below on how various systems shall be identified. In many cases the information necessary to develop
22 the unique identification labels will be provide on the Contract Drawings. The verbiage required for the
23 identification shall be as identified on the Contract Drawings. The CONTRACTOR shall request the
24 required verbiage from the ENGINEER should it not be available or clear based on the information
25 provided on the Contract Drawings.

26 Power receptacles faceplates (cover plates) shall state the panel and circuit number. A typical label might
27 read "PNL208-1-CKT 15".

28 Light switches faceplate shall state the panel and circuit number(s). A typical label might read "PNL208-2-
29 CKT 15&17".

30 Interior emergency light fixtures shall have a unique 0.5 inch adhesive dot applied to facilitate tracking
31 routine maintenance required for emergency lighting. The dots shall be red when they have an integral
32 battery back-up.

33

34

END OF SECTION

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes.

4 This Section includes requirements for conductor termination methods.

5 SUBMITTALS

6 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
7 rejected as incomplete.

8 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
9 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
10 be rejected as incomplete.

11 A submittal is required for each product specified. Each individual product submittal shall have the
12 corresponding Reference Keynote Number (example - 260583.C01) typewritten in the upper right hand
13 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
14 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
15 be rejected as incomplete.

16 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
17 specifically which components or parts are being submitted for approval. Any product submittals, such as
18 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
19 will be rejected as incomplete.

20 Product Data.

21 Pursuant to Section 013300 - Submittal Procedures.

22 Manufacturer's data including materials of construction, applications and related information for each item
23 specified in PART 2 PRODUCTS.

24 **PART 2- PRODUCTS**

25 MATERIALS

26 **Small Compression Connectors (260583.C01).**

27 Insulated fork, ring or splicing (butt) connectors shall be provided for # 10 AWG or smaller conductors that
28 splice together or terminate with a screw other than in a terminal block.

29 Connectors shall be properly sized for the conductor and for the stud used.

30 Burndy, Panduit, Thomas and Betts, or approved equal.

31 **Electrical Spring Connectors (Wire Nuts) (260583.W01).**

32 Provide properly sized spring connectors for the size and number of conductors spliced.

33 Ideal, 3M, Thomas and Betts, or approved equal.

34 ACCESSORIES

35 **Electrical Tape (260583.T40).**

36 General electrical tape shall be premium grade, all weather vinyl electrical insulating tape.

37 3M – Scotch 33+, or approved equal.

38 **Thin Wall Heat Shrink Tubing (260583.T01).**

39 Thin walled heat shrink tubing shall be flame retardant and made of cross-linked polyolefin.

40 The tubing shall have a minimum operating temperature of – 55 to + 135 degrees Celsius.

41 Burndy, Panduit, or approved equal.

42 **PART 3- EXECUTION**

1 **INSTALLATION**2 **General**

3 All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

4 Care shall be taken when terminating conductors to avoid kinking, cutting or puncturing the jacket or
5 allowing contamination by grease, oil or water.

6 Care shall be taken when terminating conductors to properly support the conductors and to avoid undue
7 pressure on the connector or utilization equipment.

8 Conductors shall be terminated by use of lugs, pressure type connectors wire nuts or terminal blocks.
9 Wrapping conductors around a screw type terminal is not acceptable.

10 Compression connectors shall be installed using the tool and die provided by the same manufacturer as
11 the connectors and as per their directions.

12 Compressions on connectors used for # 8 AWG conductors and larger shall have a minimum of two (2)
13 circumferential crimps.

14 Indenter type crimps on compression connectors shall not be used on conductors larger than # 10 AWG.

15 Connectors shall be installed as per the manufacturer's directions.

16 Insulated wire ferrules shall be provided for conductors terminated on terminal blocks utilizing a crimping
17 tool provided by the ferrule manufacture specifically for this purpose.

18 Where wire ducts in enclosures exist, conductors shall be grouped together and routed in the wire ducts
19 and shall be fanned out to the terminals.

20 Wire nuts shall be used on conductors # 10 AWG or less and only for splicing conductors at light fixtures,
21 at receptacles and motors. No other splicing of conductors with wire nuts are permitted unless specifically
22 identified on the Drawings.

23 All spare conductors shall be identified individually, neatly coiled and fastened with cable ties. The coil
24 shall be labeled to describe its origin. Spare conductors shall be left long enough to be neatly routed and
25 terminate anywhere within the enclosure.

26 Conductors installed outdoors which are not terminated the same day, shall have heavy wall heat
27 shrinkable end caps installed the same day they are pulled in. The end caps shall remain in place until
28 the day they are terminated.

29 Heavy wall heat shrink tubing shall be installed over splices or over the barrel of connectors installed
30 outdoors.

31 Thin wall heat shrink tubing shall be installed over splices or over the barrel of connectors installed
32 indoors.

33 As connections are set with a torque wrench, a black felt marker shall be used to mark across the bolt,
34 nut or screw indicating the torque has been set.

35 Insulated Mechanical Multi-Tap Connectors shall be utilized for splices located at in-ground lighting and
36 power boxes. It may also be used for motor terminations.

37

38 **END OF SECTION**

1 **PART 1- GENERAL**

2 SUMMARY

3 **Section Includes.**

4 This Section includes the requirements for interior control panels and systems.

5 SUBMITTALS

6 **Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will**
7 **be rejected as incomplete.**8 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
9 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
10 be rejected as incomplete.11 A submittal is required for each product specified. Each individual product submittal shall have the
12 corresponding Reference Keynote Number (example - 265100.101) typewritten in the upper right hand
13 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
14 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
15 be rejected as incomplete.16 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
17 specifically which components or parts are being submitted for approval. Any product submittals, such as
18 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
19 will be rejected as incomplete.20 **Product Data.**

21 Pursuant to Section 013300 Submittal Procedures.

22 Manufacturer's data including materials of construction, fixture dimensions, options provided and related
23 information for each item specified in PART 2 PRODUCTS.

24 SYSTEM DESCRIPTION

25 **All luminaires shown on the drawings and described within this Section shall form a complete**
26 **wireless lighting control mesh network. The wireless control system shall be UL listed and shall be**
27 **IEEE 802.15.4 compliant.**28 **All luminaires shown on the Drawings that are specified to be part of this wireless control system**
29 **shall incorporate integral motion / photosensors which are compatible with the wireless network.**
30 **Luminaires that do not have an integral sensor shall be provided with a remotely mounted sensor.**31 **Individual sensors, switches, and relays shall be programmable for individual or zoned control.**
32 **These devices shall all communicate via WI-FI to the Eclipse System Controller.**33 **The network shall be programmed, configured, and maintained via an iOS mobile application.**34 **The network shall incorporate seven layers of network security.**

35 SEQUENCE OF OPERATIONS

36 **Upon loss of power, all egress lighting will turn 100% on.**37 **Daylight harvesting dimming and occupancy sensor control shall be achieved using integral**
38 **photo/occupancy sensors. The sensors shall be networked wirelessly to the lighting control system.**
39 **Low voltage wall stations shall be provided. The station shall be networked wirelessly to the lighting**
40 **control system.**41 **Corridors and public areas shall be controlled with integral occupancy / daylight harvesting sensors**
42 **and on a time of day basis using the lighting control system. Low voltage wall switches shall be**
43 **provided as shown on the Drawings. The switches shall permit the lights to be turned ON during non-**
44 **operational hours for a maximum of two hours for housekeeping purposes.**45 Individual corridor lights shall dim to 25% output when motion is not sensed. When an individual enters
46 the corridor, all lights within the corridor shall turn 100% ON.

1 CONTRACTOR'S DESIGN/BUILD RESPONSIBILITIES

2 **A complete wireless lighting control system shall be fully designed by the**
3 **CONTRACTOR/MANUFACTURER. The final design has been delegated to the CONTRACTOR as a**
4 **design/build delivery method.**

5 **The following shall be provided to the ENGINEER for review and APPROVAL.**

6 Scaled floor plans (1/8" = 1'0" minimum) in electronic (PDF) format showing all luminaires, sensors,
7 switches, relays, access points, etc. that compose the wireless network.

8 A complete bill of materials for all wireless network hardware, including full part numbers, shall be
9 provided.

10 All lighting control zones as described within this Specification and as shown on the Drawings.

11 All external connections, such as network, building automation system, fire alarm, etc. shall be shown.

12 SUBSTITUTION REQUESTS

13 **All substitution requests shall meet the following:**

14 Shall be received by the ENGINEER no later than ten (10) business days prior to date of final addendum
15 during the bid period. Submittals that do not meet this requirement shall be returned as LATE and shall
16 not be considered for a substitution request.

17 Shall have clearly labeled and marked-up product data, indicating the features and part numbers.
18 Submittals shall be individually labeled with the reference key note number or luminaire identification tag
19 for which the substitution request is being made. Generic product catalog data or unmarked and or
20 unlabeled substitution requests shall not be considered and shall be returned as INCOMPLETE to the
21 CONTRACTOR.

22 All product data identified as OWNER Standard shall not be eligible for a substitution request.

23 **PART 2- PRODUCTS**

24 MATERIALS

25 **Wireless Controller (260933.C01).**

26 Shall be UL 916 listed.

27 IEEE 802.15.4 compliant.

28 POE based.

29 Shall be provided with BACNET / IP protocol compatibility.

30 Provides system timeclock for scheduling lighting control Profiles, including astronomic-clock capabilities.

31 Supports up to 750 nLight Air devices.

32 Provide in Manufacturer supplied NEMA 1 enclosure.

33 Enclosure shall be mild steel.

34 The module shall house the Eclipse Modules and associated power supplies.

35 Furnish with DIN rails, grounding, and terminal blocks on backpanel within the enclosure.

36 Shall be nLight Air Eclipse Module with Wireless.

37 **Wireless Low Voltage Switch Stations (260933.W01).**

38 Shall be provided with number of buttons as shown on the Drawings.

39 Shall be provided with raise/lower dimming control where shown on the Drawings.

40 Shall be wired to the digital daylighting & dimming lighting control system.

41 Buttons shall control individual channels as shown on the drawings.

42 Individual buttons shall allow a user to control individual zones.

1 The raise/lower buttons shall control only the zones which are turned ON. Raise/lower buttons which
2 control all lighting zones, regardless of whether the zones have been turned ON, shall not be
3 acceptable.

4 Finish shall be white.

5 nLight nPODm 4P DX Series.

6 **PART 3- EXECUTION**

7 **INSTALLATION**

8 **General**

9 All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

10 Coordinate the installation of ceiling mounted devices and equipment with the Mechanical Contractor.
11 Install occupancy sensors at least 3 feet from diffusers.

12 All sensors shall be set for occupancy mode.

13 Sequence of Operations Coordination.

14 The CONTRACTOR shall schedule an initial sequence of operations meeting with the OWNER no
15 less than three (3) weeks before the rough-in installation begins.

16 The CONTRACTOR shall be responsible to set the meeting agenda for this meeting. The
17 CONTRACTOR and a manufacturer's representative shall present the standard sequence of
18 operations with this system and the devices as shown as a starting point for developing a project
19 specific sequence of operation. This effort and the associated programming and training for Owner's
20 personnel shall be included in the Work and shall not constitute additional Work.

21 The following events shall be coordinated at this meeting:

22 Days and hours of operation for wireless lighting control system.

23 Zoning of lights.

24 Commissioning.

25 The lighting system shall be tested as per the manufacturer's recommendation.

26 The CONTRACTOR shall be responsible to document that the system is ready for testing and file the
27 appropriate paperwork and schedule the test.

28 Test all lighting control systems prior to commissioning to ensure proper operation.

29 Correct all deficiencies prior to commissioning.

30 Coordinate the final time of day operating hours with the OWNER.

31 Demonstrate to the ENGINEER and OWNER the correct operation of the lighting control system.

32 Simulate loss of normal power and demonstrate correct operation of UL 924 relays.

33 Demonstrate daylight harvesting operation.

34 Demonstrate manual dimming of all zones.

35

36

END OF SECTION

1 **PART 1- GENERAL**

2 SUMMARY

3 Section Includes.

4 This Section includes the requirements for wiring devices such as receptacles, toggle switches and
5 devices plates.

6 REFERENCES

7 The following is a list of Standards which may be references in the Section.

8 National Electrical Contractors Association (NECA): National Electrical Installation Standards (NEIS).

9 National Electrical Manufacturers Association (NEMA).

10 WD1 – General Requirements for Wiring Devices.

11 WD6 – Wiring Device Dimensional Requirements.

12 National Fire Protection Association (NFPA): 70.

13 Underwriters Laboratories, Inc. (UL): 1070.

14 SUBMITTALS

15 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
16 rejected as incomplete.

17 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
18 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
19 be rejected as incomplete.

20 A submittal is required for each product specified. Each individual product submittal shall have the
21 corresponding Reference Keynote Number (example - 262726.R01) typewritten in the upper right hand
22 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
23 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
24 be rejected as incomplete.

25 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
26 specifically which components or parts are being submitted for approval. Any product submittals, such as
27 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
28 will be rejected as incomplete.

29 Product Data.

30 Pursuant to Section 013300 Submittal Procedures.

31 Manufacturer's data including materials of construction, equipment weight, and related information for
32 each item specified in PART 2 PRODUCTS.

33 **PART 2- PRODUCTS**

34 MATERIALS

35 **General Purpose Receptacles (262726.R01).**

36 Shall be heavy duty specification grade, two-pole, three wire grounding type with screw type terminals
37 suitable for number 10 American Wire Gauge (AWG).

38 Shall be NEMA 5-20R, rated for 20 amperes, 125-volt configuration.

39 Provide duplex or single receptacles as shown on the Drawings.

40 Shall be white in color unless fed from an emergency circuit and in that case the receptacle shall be red in
41 color.

42 Provide Hubbell BR20 Commercial Specification Grade receptacles or approved equal.

1 **Device Plates (262726.P01).**

2 Install white thermoplastic faceplates at all indoor locations.

3 Provide Hubbell, or approved equal.

4 **PART 3- EXECUTION**

5 **INSTALLATION**

6 **General.**

7 All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

8 Devices shall be bonded to their enclosure and the equipment grounding conductor with a separate
9 grounding conductor attached to the device which will allow the device to be detached from the enclosure
10 without disconnecting the equipment grounding conductor from the enclosure.

11 The use of the mounting yoke as the only method for bonding is unacceptable.

12 Devices that are not installed at the end of the line (circuit) shall be pig-tailed out and the pig-tails shall be
13 connected to the line and load conductors.

14 After the pigtailed conductors are terminated on the device and before it is installed in the enclosure the
15 exposed energized parts shall be wrapped with electrical insulating tape with a minimum of three wraps.

16 As the device is installed in the enclosure, care shall be taken to neatly fold the conductors inside the
17 enclosure so as to not kink, bind or otherwise damage the sheath of the conductors.

18 Terminations on all devices shall be via pressure or compression type connectors. Wrapping conductors
19 around a termination screw and tightening is unacceptable.

20 Mounting heights for receptacles shall be 18 inches to center from finished floor unless called out
21 otherwise on the Drawings or specified at different height to meet minimum code requirements. Where
22 countertops are present, receptacles shall be mounted horizontally and mounted 4 inches to center above
23 the back-splash. The CONTRACTOR is responsible to coordinate with the approved casework submittals.
24 Failure to do so will require the CONTRACTOR to relocate devices at their expense.

25 Coordination is the responsibility of the CONTRACTOR. If a conflict exists for the mounting location of
26 devices, the CONTRACTOR shall bring it to the ENGINEER's attention during the rough-in phase and the
27 ENGINEER shall provide direction. Failure to coordinate conflicts during the rough-in phase will result in
28 relocation of devices at the CONTRACTOR's expense.

29 Devices shall be installed level and plumb. Devices shall be brought out plumb with the wall surface via
30 UL listed spacers approved for this purpose if necessary.

31 Devices shall be tested for voltage, polarity, and ground integrity.

32 The position of devices, as shown on the Drawings, are general locations only unless dimensioned. The
33 CONTRACTOR is responsible to coordinate with various trades to ensure no conflict exists.

34

35 **END OF SECTION**

1 PART 1- GENERAL**2 SUMMARY**

3 Section Includes.

4 This Section includes the requirements for the interior illumination fixtures and controls.

5 SUBMITTALS

6 Contractor shall submit all the product data in Division 26 at the same time. Piecemeal submittals will be
7 rejected as incomplete.

8 The product data shall be bound in a three ring binder with tabs for each Section. The tabs shall be
9 numbered to match the specification Section numbers. Submittals not bound and labeled as specified will
10 be rejected as incomplete.

11 A submittal is required for each product specified. Each individual product submittal shall have the
12 corresponding Reference Keynote Number (example - 265100.101) typewritten in the upper right hand
13 corner of the submittal. The submittals within each Section tab shall be in the same sequential order as
14 they are listed in the specification Section. Submittals not containing the Reference Keynote Number will
15 be rejected as incomplete.

16 No typical submittals will be accepted. Each submittal shall be project specific and clearly identify
17 specifically which components or parts are being submitted for approval. Any product submittals, such as
18 a catalog sheet, which do not clearly identify which components or parts are being submitted for approval,
19 will be rejected as incomplete.

20 Product Data.

21 Pursuant to Section 013300 Submittal Procedures.

22 Manufacturer's data including materials of construction, fixture dimensions, options provided and related
23 information for each item specified in PART 2 PRODUCTS.

24 SUBSTITUTION REQUESTS

25 All substitution requests shall meet the following:

26 Shall be received by the ENGINEER no later than ten (10) business days prior to date of final addendum
27 during the bid period. Submittals that do not meet this requirement shall be returned as LATE and shall
28 not be considered for a substitution request.

29 Shall have clearly labeled and marked-up product data, indicating the features and part numbers.
30 Submittals shall be individually labeled with the reference key note number or luminaire identification tag
31 for which the substitution request is being made. Generic product catalog data or unmarked and or
32 unlabeled substitution requests shall not be considered and shall be returned as INCOMPLETE to the
33 CONTRACTOR.

34 All product data identified as OWNER Standard shall not be eligible for a substitution request.

35 PART 2- PRODUCTS**36 FIXTURES**

37 Reference the Luminaire Schedule for all Interior Luminaires.

38 PART 3- EXECUTION**39 INSTALLATION**

40 General.

41 All identification labeling shall be in compliance with Section 260553 Electrical and Control Identification.

42 CONTRACTOR shall provide all mounting hardware required to mount luminaires in lay-in or gypsum
43 board ceilings. Verify ceiling types with the ARCHITECT. Luminaires of a given type may be used in
44 more than one type of ceiling.

45 Luminaires shall be supported by #12 AWG hanger wire connected to the luminaire and the building

INTERIOR LIGHTING

26 51 00-2

- 1 structure.
- 2 Positively attach all luminaires to the suspended ceiling system. Attachment devices shall have capacity
- 3 of 100% of the luminaire weight acting in any direction.
- 4 Verify luminaire locations with the ARCHITECT'S reflected ceiling plan.
- 5 Adjustable luminaire heads shall be aimed as directed by the ENGINEER.
- 6 All luminaires shall be cleaned of all dirt, dust, and finger prints prior to close-out.

7

8

END OF SECTION

SHERIDAN FIRE STATION SEISMIC UPGRADE

CARLSON VEIT JUNGE ARCHITECTS PC
ARCHITECTURE • INTERIOR DESIGN
WWW.CARLSONVEIT.COM 3095 RIVER RD N. SALEM, OR 97303

REGISTERED ARCHITECT
NICHOLAS L. WALLACE
SALEM, OREGON
STATE OF OREGON

MATERIAL REFERENCE

	EARTH		LOOSE BATT INSUL
	GRANULAR FILL		RIGID INSULATION
	BRICK		GLASS
	CONCRETE		METAL
	PLASTER, GROUT		PLYWOOD
	ASPHALT		CONCRETE MASONRY UNITS
	FINISH WOOD		GYPSUM WALLBOARD
	DIMENSION WOOD		CERAMIC TILE
	ACOUSTICAL TILE		

PROJECT DIRECTORY

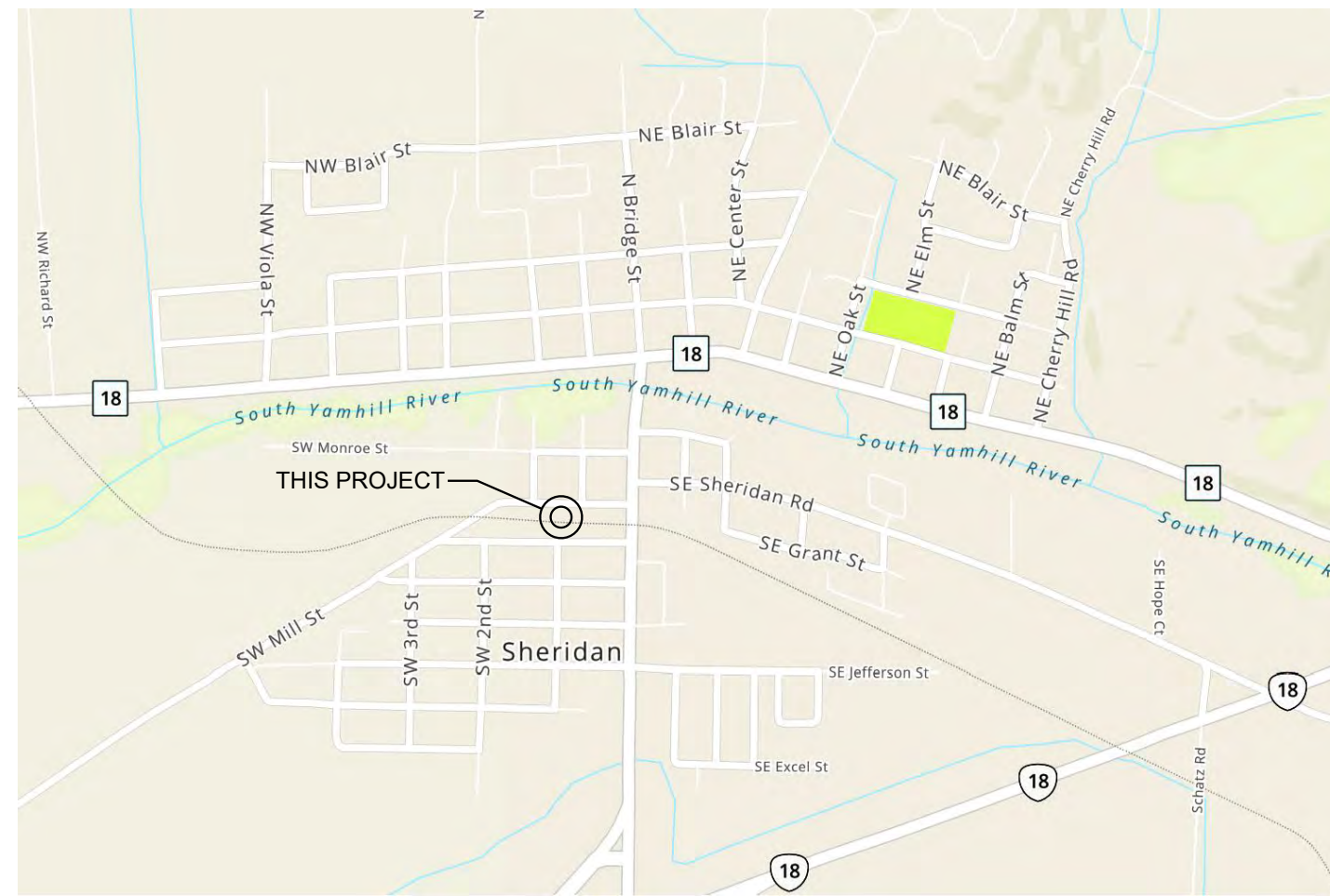
OWNER:
SHERIDAN FIRE DISTRICT
230 SW MILL STREET
SHERIDAN, OREGON 97378
PHONE: (503) 843-2467

ARCHITECT:
CARLSON VEIT JUNGE ARCHITECTS
3095 RIVER ROAD N
SALEM, OREGON 97303
PHONE: (503) 390-0281

STRUCTURAL ENGINEER:
MSC ENGINEERS INC.
3470 PIPEBEND PLACE NE
SUITE 120
SALEM, OREGON 97301
PHONE: (503) 399-1399

MECHANICAL & PLUMBING ENGINEER:
RACI ENGINEERING DESIGNS
38515 PIT ROAD
PHILOMATH, OREGON 97370
PHONE: (503) 871-2614

ELECTRICAL ENGINEER:
LANDIS CONSULTING
6446 FAIRWAY AVENUE SE, SUITE 220
SALEM, OREGON 97306
PHONE: (503) 584-1576



LOCATION MAP
N.T.S.

SYMBOLS / LEGEND

(NOT ALL ITEMS MAY BE USED IN THESE DRAWINGS)

	EXISTING WALL TO REMAIN		NEW DOOR & DOOR MARK		VIEW OF SECTION
	EXISTING ITEM TO BE REMOVED		EXISTING DOOR TO REMAIN		SECTION CUT SYMBOL
	WOOD STUD WALL		EXISTING DOOR TO BE REMOVED		DETAIL NUMBER
	CMU WALL		FIRE EXTINGUISHER CABINET		DETAIL CUT BUBBLE
	KEY NOTE TAG		FIRE EXTINGUISHER		VIEW OF ELEVATION
	WINDOW MARK				INTERIOR ELEVATION
	ROOM NAME				REVISION CLOUD & REVISION NUMBER
	ELEVATION TAG				

CODE SUMMARY

THIS PROJECT COMPRISES A SEISMIC RETROFIT FOR AN EXISTING FIRE STATION.
NO CHANGE OF USE OR OCCUPANCY.

BUILDING CODE - 2019 OSSC	
OCCUPANCY GROUPS	B, R-2, S-2
CONSTRUCTION TYPE	V-B, NFPA 13 FIRE SPRINKLERS, MULTI-STORY
ALLOWABLE BUILDING AREA	21,000 SF (R-2 MOST RESTRICTIVE)
EXISTING BUILDING AREA	9,584 SF

INDEX OF DRAWINGS

GENERAL

G-001 TITLE SHEET

STRUCTURAL

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S2.11	UPPER ROOF FRAMING PLAN
S5.10	FOUNDATION DETAILS
S7.10	FLOOR FRAMING DETAILS
S7.11	FLOOR FRAMING DETAILS
S8.10	ROOF FRAMING DETAILS
S8.11	ROOF FRAMING DETAILS

ARCHITECTURAL

A-101	FLOOR PLANS
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MECHANICAL

M-001	COVER SHEET
M-002	SYMBOLS, LEGEND, ABBREVIATIONS
M-101	DEMOLITION HVAC FIRST FLOOR PLAN (RCP)
M-102	DEMOLITION HVAC SECOND FLOOR PLAN (RCP)
M-201	REMODEL HVAC FIRST FLOOR PLAN WEST
M-202	REMODEL HVAC FIRST FLOOR PLAN EAST (RCP)
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M-501	MECHANICAL DETAILS
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ELECTRICAL

E0.1	ELECTRICAL SYMBOL LEGEND & ABBREVIATIONS
E0.2	LUMINAIRE SCHEDULE
E2.0	LIGHTING DEMOLITION PLAN
E2.1	LIGHTING PLAN
E3.0	POWER DEMOLITION PLAN
E4.0	ELECTRICAL ROOF DEMOLITION PLAN

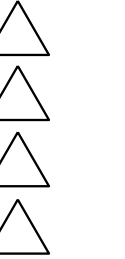
ABBREVIATIONS

(REFER TO CONSULTANT DRAWINGS FOR ADDITIONAL ABBREVIATIONS)

AB ANCHOR BOLT	DF DRINKING FOUNTAIN	GA GAGE	MATL MATERIAL	PAF POWDER ACTUATED	S SOUTH	VCT VINYL COMPOSITION TILE
ACST ACOUSTIC	DIA DIAMETER	GALV GALVANIZED	MAX MAXIMUM	FASTENER	SC SOLID CORE	VERT VERTICAL
ADJ ADJUSTABLE, ADJUST	DIM DIMENSION	GB GRAB BAR	MB MACHINE BOLT	PBD PARTICLE BOARD	SCR SCREW	VNR VENEER
AFF ABOVE FINISHED FLOOR	DIV DIVIDE, DIVIDED, DIVISION	GL GLASS	MECH MECHANICAL	PL PROPERTY LINE, PLATE	SD SOAP DISPENSER, SMOKE DETECTOR,	VTR VENT THROUGH ROOF
ALUM ALUMINUM	DR DOOR	GLB GLU-LAM BEAM	MFR MANUFACTURER	PLAM PLASTIC LAMINATE	STORM DRAIN	WAINS WAINSCOT
ANOD ANODIZED	DS DOWNSPOUT	GYP BD GYPSUM BOARD	MH MANHOLE	PLBG PLUMBING	SQUARE FOOT	W WEST, WIDE, WIDTH
APPROX APPROXIMATELY	DTL DETAIL		MI MIRROR	PLYWD PLYWOOD	SHEATHING	WC WATER CLOSET
ASPH ASPHALT	DWG DRAWING		MIN MINIMUM	PNL PANEL	SHT SHEET	WD WOOD
BD BOARD	E EAST	HCP HOSE BIBB	MISC MISCELLANEOUS	PR PAIR	SIM SIMILAR	WDW WINDOW
BLDG BUILDING	EA EACH	HDR HANDICAP, HOLLOW CORE	MO MOUNT	PRKG PARKING	SPEC SPECIFICATION, SPECIFIED	WH WATER HEATER
BLKG BLOCKING	EF EXHAUST FAN	HDW HARDWARE	MT MOUNT	PTD PAPER TOWEL DISPENSER	SPKR SPEAKER	W/O WITHOUT
BM BENCH MARK, BEAM	EJ EXPANSION JOINT	HC HOLLOW CORE	MTL METAL	PTN PARTITION	SQ SQUARE	WP WATERPROOFING
BOT BOTTOM	EL ELEVATION	HORIZ HORIZONTAL	N NORTH	PT POINT	SSK SERVICE SINK	WRB WEATHER RESISTIVE BARRIER
BUR BUILT-UP ROOFING	ELEC ELECTRIC, ELECTRICAL	HS HOLLOW STEEL, HIGH STRENGTH	NOT IN CONTRACT	PVC POLYVINYL CHLORIDE	SST STAINLESS STEEL	WT WEIGHT
CAB CABINET	ELEV ELEVATOR	HT HIGH STRENGTH	NL NIGHT LIGHT	PVMT PAVEMENT	STD STANDARD	WWF WELDED WIRE FABRIC
CB CATCH BASIN, CORNER BEAD	ENCL ENCLOSURE	HVAC HEATING VENTILATING AIR CONDITIONING	NO NUMBER		STL STEEL	
CG CORNER GUARD	EQ EQUIPMENT	HW HOT WATER	NTS NOT TO SCALE		STOR STORAGE	
CHBD CHALKBOARD	EW EACH WAY	INSUL INSULATE, INSULATED, INSULATION	OA OVERALL OUTSIDE AIR		STRUC STRUCTURE, STRUCTURAL	
CI CAST IRON	EXIST EXISTING	INT INTERIOR	OBS OBSOLETE		SUSP SUSPENDED	
CJ CONTROL JOINT	EXP B EXPANSION BOLT	INV INVERT	OC ON CENTER	RECEP RECEPTACLE	T TEMPERED, TREAD	
CLG CEILING	EXT EXTERIOR		OCW ON CENTER EACH WAY	REF REFERENCE, REFRIGERATOR	TEL TELEPHONE	
CLR CLEAR, CLEARANCE			OD OUTSIDE DIAMETER	REINF REINFORCE, REINFORCEMENT	T&G TONGUE & GROOVE	
CMU CONCRETE MASONRY UNIT	FD FLOOR DRAIN	JAN JANITOR	OFCI OWNER FURNISHED-CONTRACTOR INSTALLED	REQD REQUIRED	THK THICK, THICKNESS, THICKENED	
COL COLUMN	FDTN FOUNDATION	J-BOX JOINT BOX	OH OVERHEAD	REV REVISION, REVISED	TOC TOP OF CURB	
CONC CONCRETE	FE FIRE EXTINGUISHER	JST JOIST	OPG OPENING	RHWS ROUND HEAD WOOD SCREW	TPD TOILET PAPER DISPENSER	
CONSTR CONSTRUCTION	FEC FIRE EXTINGUISHER CABINET	JT JOINT	OFOI OWNER FURNISHED-OWNER INSTALLED	RM ROOM	TYP TYPICAL	
CONTR CONTINUOUS, CONTINUE	FH FIRE HYDRANT	KD KNOCKED DOWN	OPP OPPOSITE	RO ROUGH OPENING		
CONTR CONTRACTOR	FHWS FLATHEAD WOOD SCREW	LAM LAMINATE		ROW RIGHT OF WAY		
CNTR COUNTER	FIN FINISH, FINISHED	LAV LAVATORY				
CRS COURSE, COURSES	FIN FLR FINISHED FLOOR	LS LANDSCAPING				
CSK COUNTERSINK, COUNTERSUNK	FL FLOOR	LT LIGHT				
CW COLD WATER	FLASH FLASHING					
	FTG FOOTING					
	FOS FACE OF STUD					

project: SHERIDAN FIRE STATION SEISMIC UPGRADE
230 SW MILL STREET
SHERIDAN, OR 97378
consultants:

revisions:



date: 06-03-2021

project: 06519

dwg file: G-001-X-06519

drawn by: NW

checked by:

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Carlson Veit Architects P.C.

TITLE SHEET

sheet:

G-001

of:

HOLDOWN SCHEDULE 1,2,3,4,5 (NOT ALL HOLDOWN TYPES SHOWN MAY BE USED ON PROJECT)										
MARK	HOLDOWN	ANCHOR BOLT	ANCHOR SIZE	EMBED LENGTH	MINIMUM STEM WALL	MINIMUM MEMBER	ANCHORAGE TO WOOD	REMARKS	ALLOWABLE LOAD (WIND)	ALLOWABLE LOAD (SEISMIC)
▽	HDL2	F1554 GR36	3/4"	5 1/2"	N/A	(2) 2x4 [#]	(6) 1/2"x2 1/2"	THREADED ROD EPOXIED INTO EXISTING CMU W/ SIMPSON SET-35 EPOXY	2,515#	2,515#
▽	HDL2	F1554 GR36	3/4"	6"	N/A	(2) 2x4 [#]	(6) 1/2"x2 1/2"	THREADED ROD EPOXIED INTO EXISTING CONCRETE FTG. W/ SIMPSON SET-35 EPOXY	3,920#	2,940#
▽	HDL2	F1554 GR36	3/4"	8"	N/A	(2) 2x4 [#]	(6) 1/2"x2 1/2"	THREADED ROD EPOXIED INTO EXISTING CONCRETE FTG. W/ SIMPSON SET-35 EPOXY	4,667#	3,500#
▽	3/8" PLATE	F1554 GR36	3/4"	4"	6"	(2) 2x6 [#]	(8) 1/2"x2 1/2"	STEEL PLATE @ FACE OF EXISTING CONCRETE	5,533#	4,150#
▽	3/8" PLATE	F1554 GR36	3/4"	4"	6"	(2) 2x6 [#]	(10) 1/2"x3"	STEEL PLATE @ FACE OF EXISTING CONCRETE	7,000#	5,250#
▽	3/8" PLATE	F1554 GR36	3/4"	N/A	6"	(2) 2x4 [#]	(8) 1/2"x3"	STEEL PLATE @ FACE OF EXISTING CMU	5,809#	5,809#
▽	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
▽	HDL2	N/A	3/4"	N/A	N/A	(2) 2x6 [#]	(6) 1/2"x2 1/2"	NOTE 9	3,075#	3,075#
▽	MSTC8	N/A	N/A	N/A	N/A	(2) 2x6 [#]	(12) 10# COMMON	N/A	1,155#	1,155#
▽	MSTC40	N/A	N/A	N/A	N/A	(2) 2x6 [#]	(28) 10# COMMON	N/A	2,695#	2,695#
▽	MSTC52	N/A	N/A	N/A	N/A	(2) 2x6 [#]	(44) 10# COMMON	N/A	4,235#	4,235#
▽	MST72	N/A	N/A	N/A	N/A	(2) 2x6 [#]	(48) 10# COMMON	N/A	3,253#	3,253#

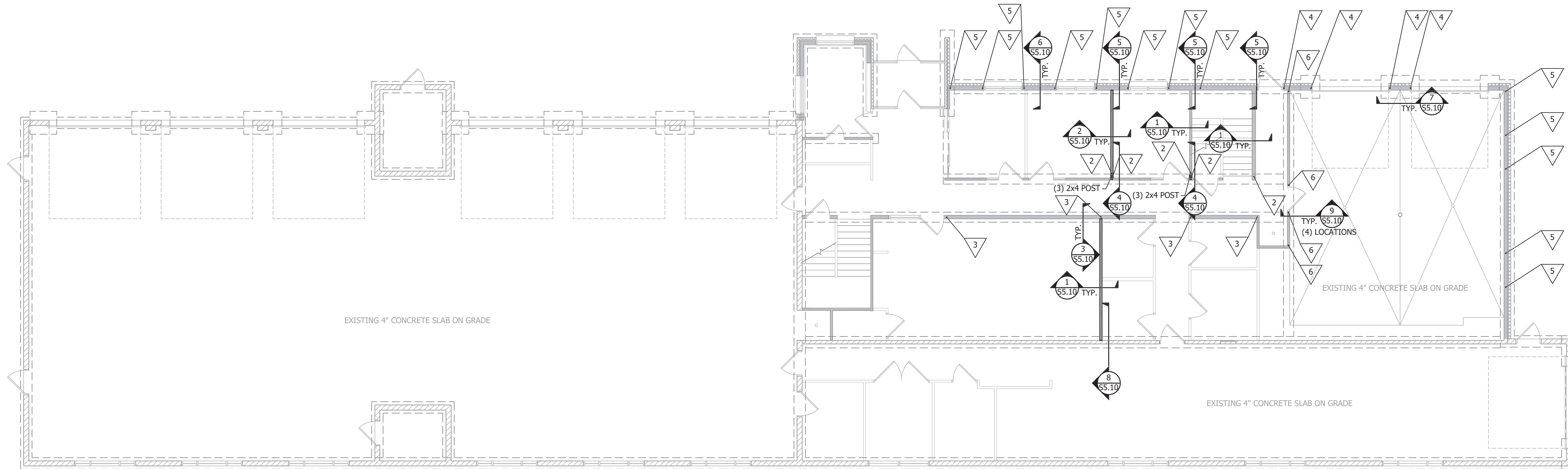
▽ DENOTES LOCATION OF HOLDOWN AT BOTTOM OF WALL

NOTES:
1. HOLDOWNS BY SIMPSON STRONG-TIE COMPANY, INC. SEE SIMPSON CATALOG FOR PROPER INSTALLATION.
2. HARDMOUNT ALL HOLDOWN ANCHORS PRIOR TO CONCRETE POUR.
3. EDGE NAIL SHEATHING TO ALL POSTS OR BOUNDARY MEMBERS AT HOLDOWNS.
4. LOCATE HD WITHIN 6" OF END OF SHEAR PANEL.
5. INSTALL HD MINIMUM OF 5" CLEAR FROM CORNER.

6. LAMINATE STUDS WITH 16d NAILS AT 12" O.C. STAGGERED. CLINCH TIPS OF NAILS.
7. USE SIMPSON SDS 3/4" WOOD SCREWS.
8. ASSUMES A DF SILL OR SOLE PLATE. 6x6 BOUNDARY MEMBER REQUIRED WITH HF SOLE PLATE.
9. 1/2" THREADED ROD THROUGH FLOOR TRJ HDL2 AT TOP OF LOWER WALL.

SHEAR WALL SCHEDULE 1,2,3,4,6,7,8,9 (NOT ALL WALL TYPES SHOWN MAY BE USED ON PROJECT)										
WALL TYPE	STRUCTURAL PANEL SHEATHING	EDGE NAILING	FIELD NAILING	REMARKS	A35 CLIP DOUBLE TOP PLATE CONN. ⁵	SILL PLATE CONN. (A.B.)		SOLE PLATE CONNECTION	SHEAR VALUE (pF) SEISMIC	SHEAR VALUE (pF) WIND
						3/8" SIMPSON TITEN HD, EMBED=2 1/2"	1"-4" O.C. ¹⁰			
◇	3/4" OSB or 3/4" PLYWOOD	0.148" x 3" NAILS @ 6" O.C.	0.148" x 3" NAILS @ 12" O.C.		24" O.C.	1"-4" O.C. ¹⁰		16d NAILS @ 6" O.C.	320	335
◇	3/4" OSB or 3/4" PLYWOOD	0.148" x 3" NAILS @ 4" O.C.	0.148" x 3" NAILS @ 12" O.C.		16" O.C.	1"-4" O.C. ¹⁰		16d NAILS @ 4" O.C.	450	450
◇	3/4" OSB or 3/4" PLYWOOD ¹	0.148" x 3" NAILS @ 3" O.C.	0.148" x 3" NAILS @ 12" O.C.		12" O.C.	8" O.C. ¹⁰		16d NAILS @ 3" O.C.	563	563

NOTES:
1. BLOCK ALL EDGES OF SHEATHING. U.O.N.
2. DO NOT BREAK SHEATHING SKIN BY OVER DRIVING NAILS.
3. PRE-DRILL AS REQUIRED TO AVOID SPLITTING SILLS, ETC.
4. NAILS SHOULD BE LOCATED 1/2" CLEAR OF PANEL EDGES.
5. USE SIMPSON A35 CLIPS TO ATTACH BLOCKING OR GABLE TO TOP PLATE AT FLOOR LINE. AT ROOF LINE USE SIMPSON H1 CLIPS AT EACH TRUSS (U.O.N.).
6. VALUES OF OTHER STANDARD CONSTRUCTION FASTENERS WILL REQUIRE SPACING ADJUSTMENTS AND MUST BE APPROVED BY THE ENGINEER-OF-RECORD.
7. USE HOT DIPPED GALVANIZED NAILS AT ALL EXTERIOR APPLICATIONS.
8. C.O., C.C SHEATHING, PLYWOOD PANEL SIDING, AND OTHER GRADES COVERED IN APA PLYWOOD DESIGN SPECIFICATION.
9. SHEATHING FACE GRAIN CAN BE APPLIED PERPENDICULAR OR PARALLEL TO WALL STUDS, PROVIDED STUDS ARE SPACED A MAXIMUM OF 16" O.C.
10. 3"x3"x2" WASHER REQUIRED AT EACH A.B. PLACE WITHIN 1/2" OF STRUCTURAL PANEL SHEATHING.
11. ALL FRAMING MEMBERS RECEIVING EDGE NAILING FROM ABUTTING PANELS SHALL NOT BE LESS THAN A 3" NOMINAL OR THICKER MEMBER OR (2) 2" MEMBERS NAILED WITH 10d NAILS 4" O.C. STAGGERED. PANEL JOINT NAILING SHALL BE STAGGERED.
12. FRAMING AT ADJOINING PANEL EDGES SHALL BE 3" NOMINAL MEMBER OR WIDER AND NAILS SHALL BE STAGGERED WHERE NAILS ARE SPACED 2" OR LESS O.C. OR WHERE 10d NAILS HAVE PENETRATION INTO FRAMING OF MORE THAN 1/2" ARE SPACED 3" OR LESS O.C.



FOUNDATION PLAN
1/8" = 1'-0"

INDEX	
	EXISTING BEARING WALLS (2x STUDS @ 16" OC, U.O.N.)
	STRUCTURAL WALL
	EXISTING MASONRY WALL
	EXISTING VENEER
	EXISTING NON-STRUCTURAL WALLS
	HOLDOWN

project: SHERIDAN FIRE STATION SEISMIC UPGRADE
230 SW MILL ST.
SHERIDAN, OREGON 97378
consultants: MSC ENGINEERS

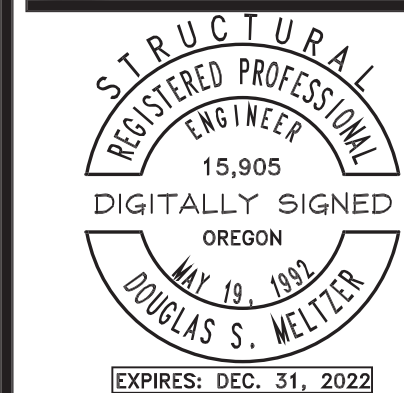
revisions:

date: 06/03/2021
project: 201229
drawn by: JCP
checked by: BK/DSM
copyright:
MSC Engineers, Inc.

FOUNDATION PLAN

sheet: **S1.10**

of:



CARLSON VEIT JUNGE ARCHITECTS PC
ARCHITECTURE • INTERIOR DESIGN
WWW.CARLSONVEIT.COM 3095 RIVER RD N, SALEM, OR 97303

HOLDOWN SCHEDULE 1.2.3.4.5										
(NOT ALL HOLDOWN TYPES SHOWN MAY BE USED ON PROJECT)										
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▽	HDU2	F1554 GR36	3/4"	5 1/2"	N/A	(2) 2x4	(6) 1/2"x2x2"	THREADED ROD EPOXIED INTO EXISTING CMU W/ SIMPSON SET-35 EPOXY	2,515#	2,515#
▽	HDU2	F1554 GR36	3/4"	6"	N/A	(2) 2x4	(6) 1/2"x2x2"	THREADED ROD EPOXIED INTO EXISTING CONCRETE FTG. W/ SIMPSON SET-35 EPOXY	3,920#	2,940#
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▽	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
▽	HDU2	N/A	3/4"	N/A	N/A	(2) 2x6	(6) 1/2"x2x2"	NOTE 9	3,075#	3,075#
▽	MSTC28	N/A	N/A	N/A	N/A	(2) 2x6	(12) 10d COMMON	N/A	1,155#	1,155#
▽	MSTC40	N/A	N/A	N/A	N/A	(2) 2x6	(28) 10d COMMON	N/A	2,695#	2,695#
▽	MSTC52	N/A	N/A	N/A	N/A	(2) 2x6	(44) 10d COMMON	N/A	4,235#	4,235#
▽	MST72	N/A	N/A	N/A	N/A	(2) 2x6	(48) 10d COMMON	N/A	3,253#	3,253#

▽ DENOTES LOCATION OF HOLDOWN AT BOTTOM OF WALL

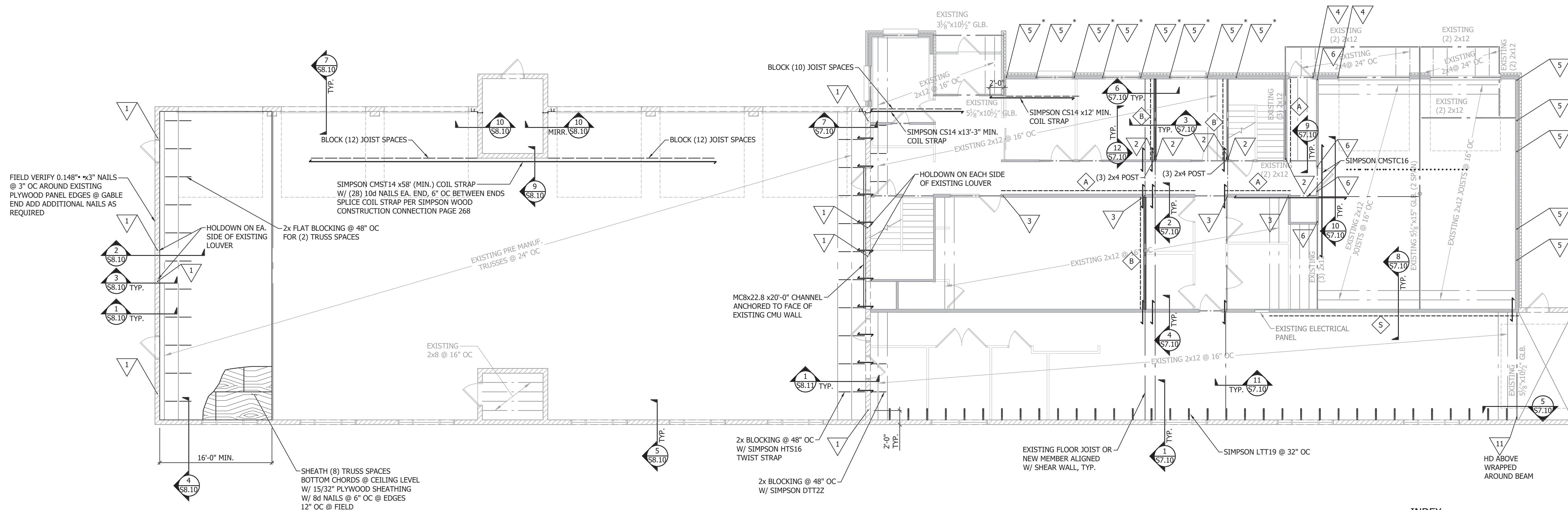
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SHEAR WALL SCHEDULE 1.2.3.4.6.7.8.9									
(NOT ALL WALL TYPES SHOWN MAY BE USED ON PROJECT)									
WALL TYPE	STRUCTURAL PANEL SHEATHING	EDGE NAILING	FIELD NAILING	REMARKS	A35 CLIP DOUBLE TOP PLATE CONN. ¹	SILL PLATE CONN. (A.B.) 3/8" SIMPSON TITEN HD, EMBED=2x2"	SOLE PLATE CONNECTION	SHEAR VALUE (pF) SEISMIC	SHEAR VALUE (pF) WIND
◇	1/2" OSB or 1/2" PLYWOOD	0.148" x 3" NAILS @ 6" O.C.	0.148" x 3" NAILS @ 12" O.C.		24" O.C.	1'-4" O.C. ¹⁰	16d NAILS @ 6" O.C.	320	335
◇	1/2" OSB or 1/2" PLYWOOD	0.148" x 3" NAILS @ 4" O.C.	0.148" x 3" NAILS @ 12" O.C.		16" O.C.	1'-4" O.C. ¹⁰	16d NAILS @ 4" O.C.	450	450
◇	1/2" OSB or 1/2" PLYWOOD ¹	0.148" x 3" NAILS @ 3" O.C.	0.148" x 3" NAILS @ 12" O.C.		12" O.C.	8" O.C. ¹⁰	16d NAILS @ 3" O.C.	563	563

NOTES:

- BLOCK ALL EDGES OF SHEATHING, U.O.N.
- DO NOT BREAK SHEATHING SKIN BY OVER DRIVING NAILS.
- PRE-DRILL AS REQUIRED TO AVOID SPLITTING SILLS, ETC.
- NAILS SHOULD BE LOCATED 1/2" CLEAR OF PANEL EDGES.
- USE SIMPSON A35 CLIPS TO ATTACH BLOCKING OR GABLE TO TOP PLATE AT FLOOR LINE. AT ROOF LINE USE SIMPSON H1 CLIPS AT EACH TRUSS (U.O.N.).
- VALUES OF OTHER STANDARD CONSTRUCTION FASTENERS WILL REQUIRE SPACING ADJUSTMENTS AND MUST BE APPROVED BY THE ENGINEER-OF-RECORD.
- USE HOT DIPPED GALVANIZED NAILS AT ALL EXTERIOR APPLICATIONS.
- C.O., C.C SHEATHING, PLYWOOD PANEL SIDING, AND OTHER GRADES COVERED IN APA PLYWOOD DESIGN SPECIFICATION.
- SHEATHING FACE GRAIN CAN BE APPLIED PERPENDICULAR OR PARALLEL TO WALL STUDS, PROVIDED STUDS ARE SPACED A MAXIMUM OF 16" O.C.
- 3"x3"x2" WASHER REQUIRED AT EACH A.B. PLACE WITHIN 1/2" OF STRUCTURAL PANEL SHEATHING.
- ALL FRAMING MEMBERS RECEIVING EDGE NAILING FROM ABUTTING PANELS SHALL NOT BE LESS THAN A 3" NOMINAL OR THICKER MEMBER OR (2) 2" MEMBERS NAILED WITH 10d NAILS 4" OC STAGGERED. PANEL JOINT NAILING SHALL BE STAGGERED.
- FRAMING AT ADJOINING PANEL EDGES SHALL BE 3" NOMINAL MEMBER OR WIDER AND NAILS SHALL BE STAGGERED WHERE NAILS ARE SPACED 2" OR LESS OC, OR WHERE 10d NAILS HAVE PENETRATION INTO FRAMING OF MORE THAN 1/2" ARE SPACED 3" OR LESS OC.



LOWER ROOF/SECOND FLOOR FRAMING PLAN
1/8" = 1'-0"

INDEX	
	EXISTING BEARING WALLS (2x STUDS @ 16" O.C., U.O.N.)
	STRUCTURAL WALL
	NEW INFILL WALL (2x6 STUDS @ 16" O.C.)
	EXISTING MASONRY WALL
	NEW VENEER
	EXISTING VENEER
	EXISTING NON-STRUCTURAL WALLS
	HOLDOWN
	ALIGN HOLDOWN WITH HOLDOWN ABOVE
	ALIGN HOLDOWN WITH HOLDOWN BELOW
	SIMPSON MST30 STRAP, U.O.N.
	SHEAR WALL

project: SHERIDAN FIRE STATION SEISMIC UPGRADE
230 SW MILL ST.
SHERIDAN, OREGON 97378

consultants: **MSC** ENGINEERS
SINCE 1925
CONSULTING STRUCTURAL ENGINEERS
15400 NE Oregon Ave
Suite 100
Portland, OR 97230
503.281.9991
mscengineers.com

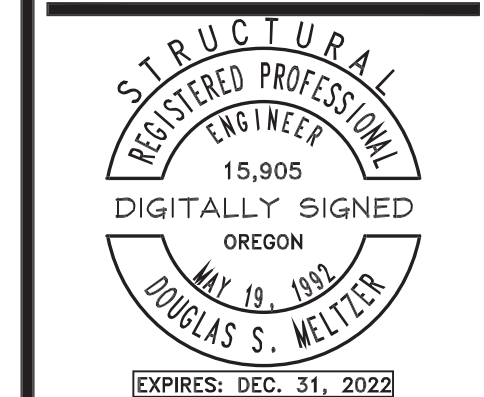
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project: 201229
drawn by: JCP
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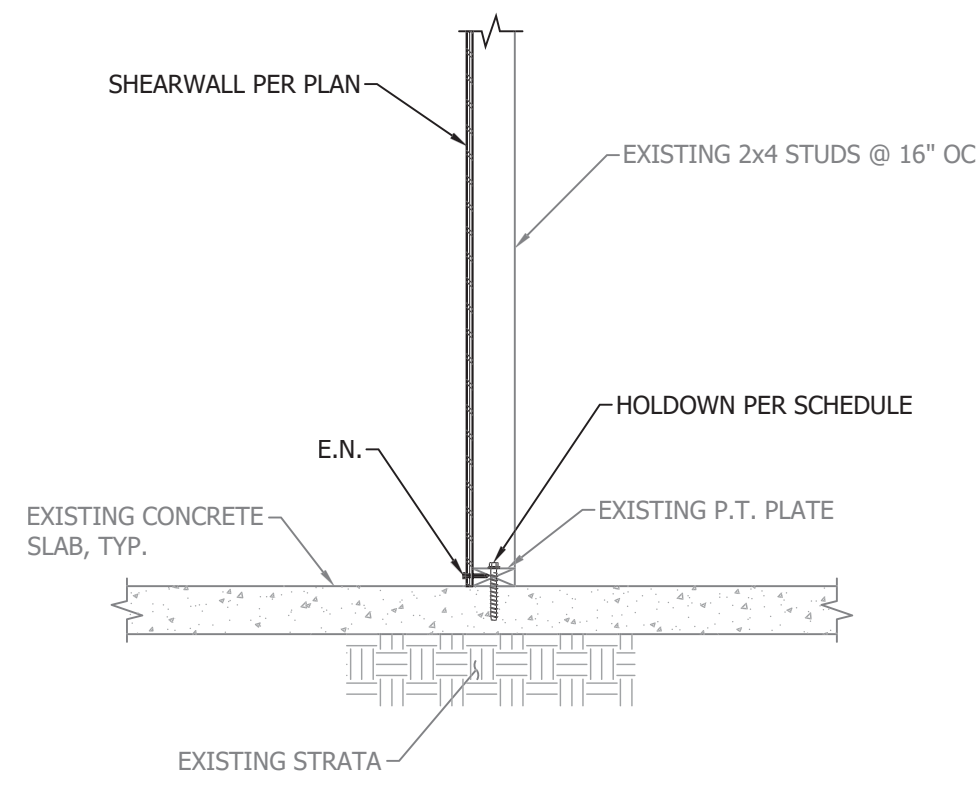
LOWER ROOF /SECOND FLOOR FRAMING PLAN

sheet: **S2.10**

of:



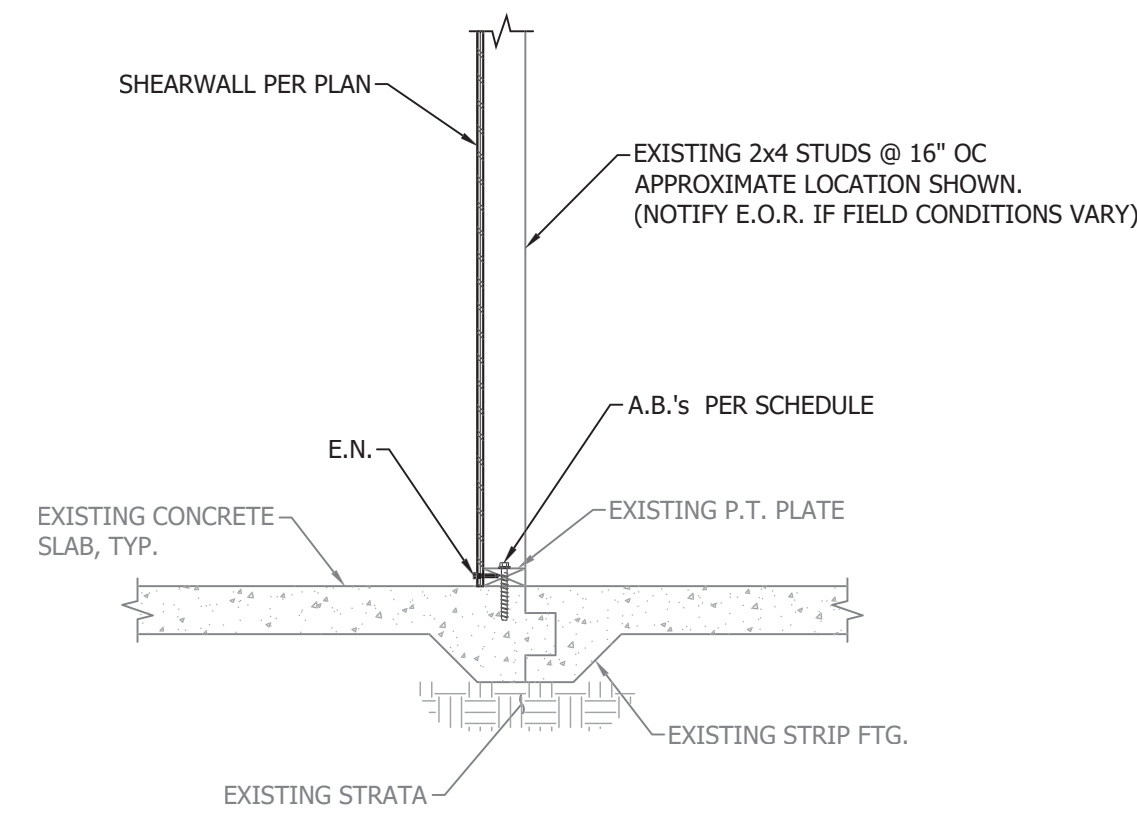
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TYPICAL INTERIOR SHEARWALL @ EXISTING SLAB ON GRADE

3/4" = 1'-0"

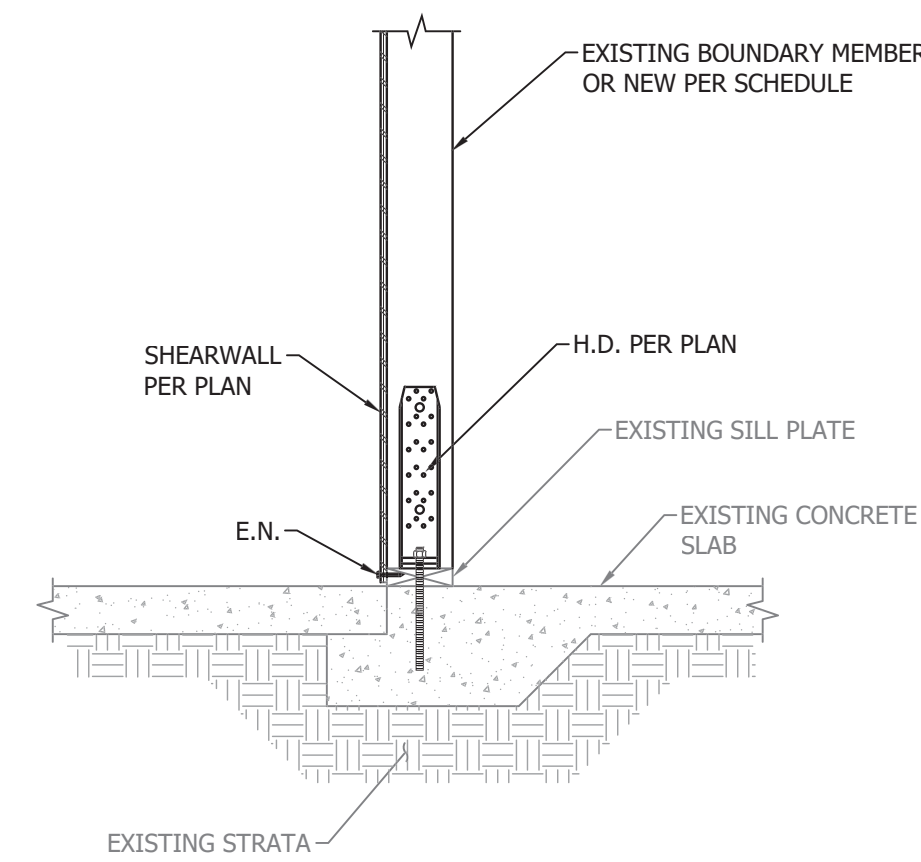
1
S5.10



SHEARWALL @ EXISTING STRIP FOOTING

3/4" = 1'-0"

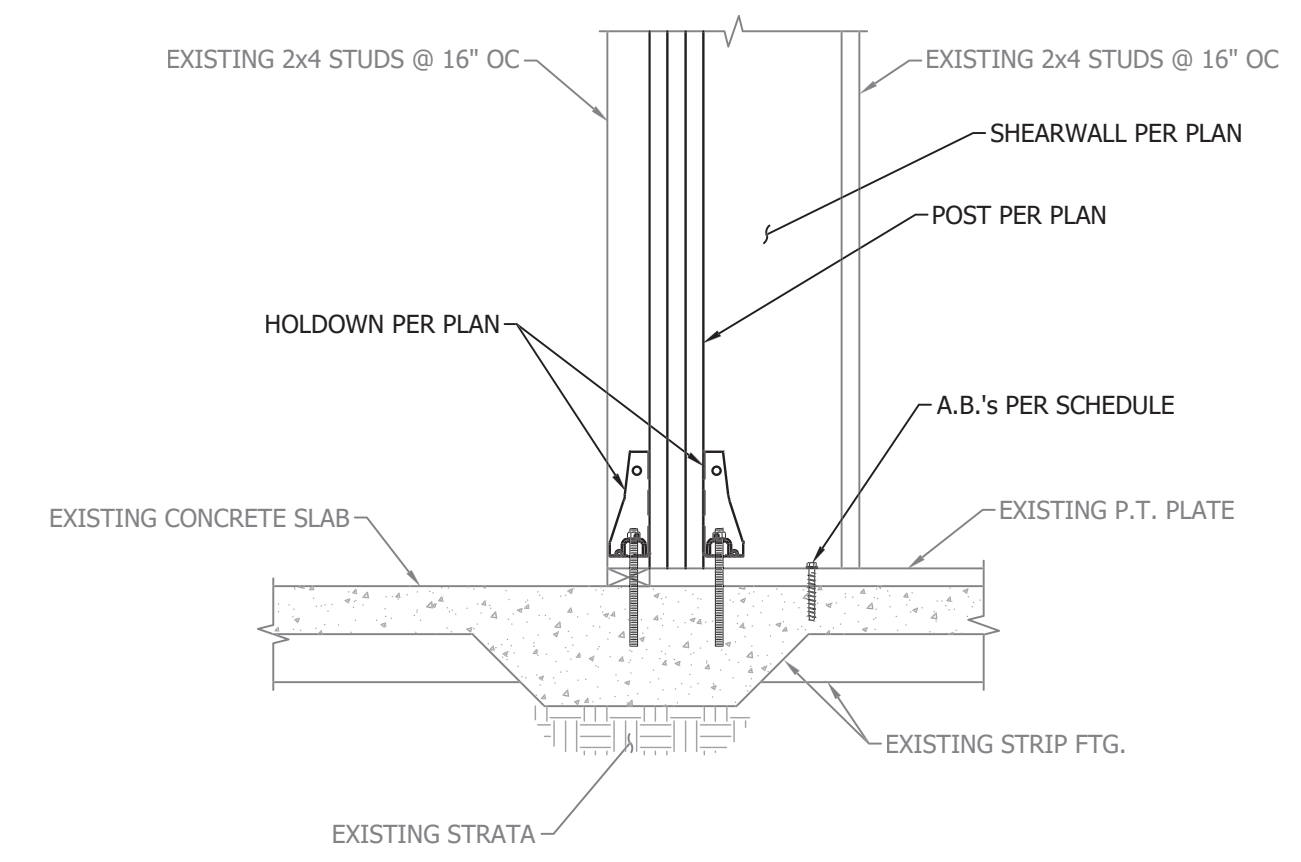
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SHEARWALL @ EXISTING STRAP FOOTING

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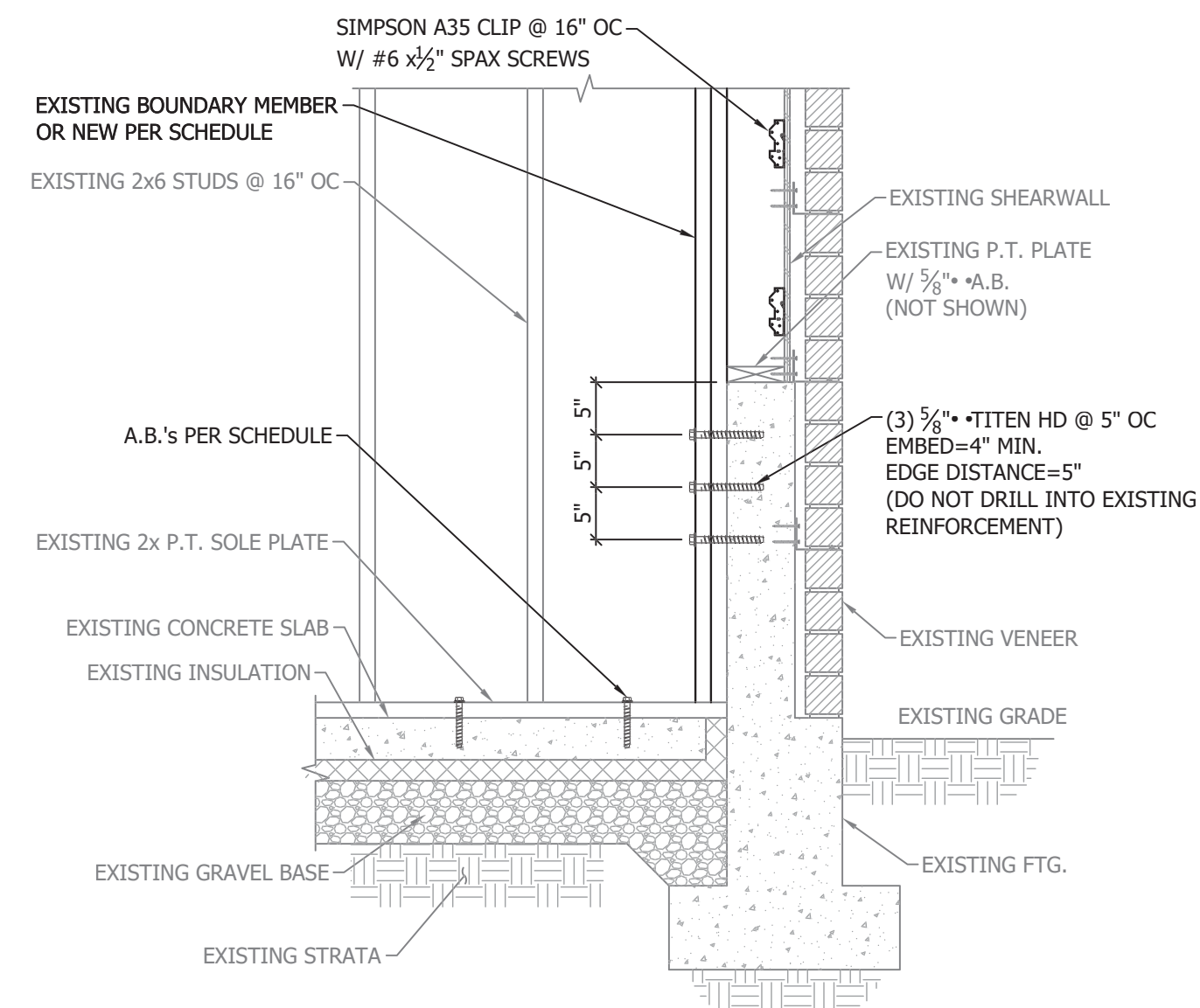
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S5.10



DBL. HOLDOWN @ EXISTING STRIP FOOTING

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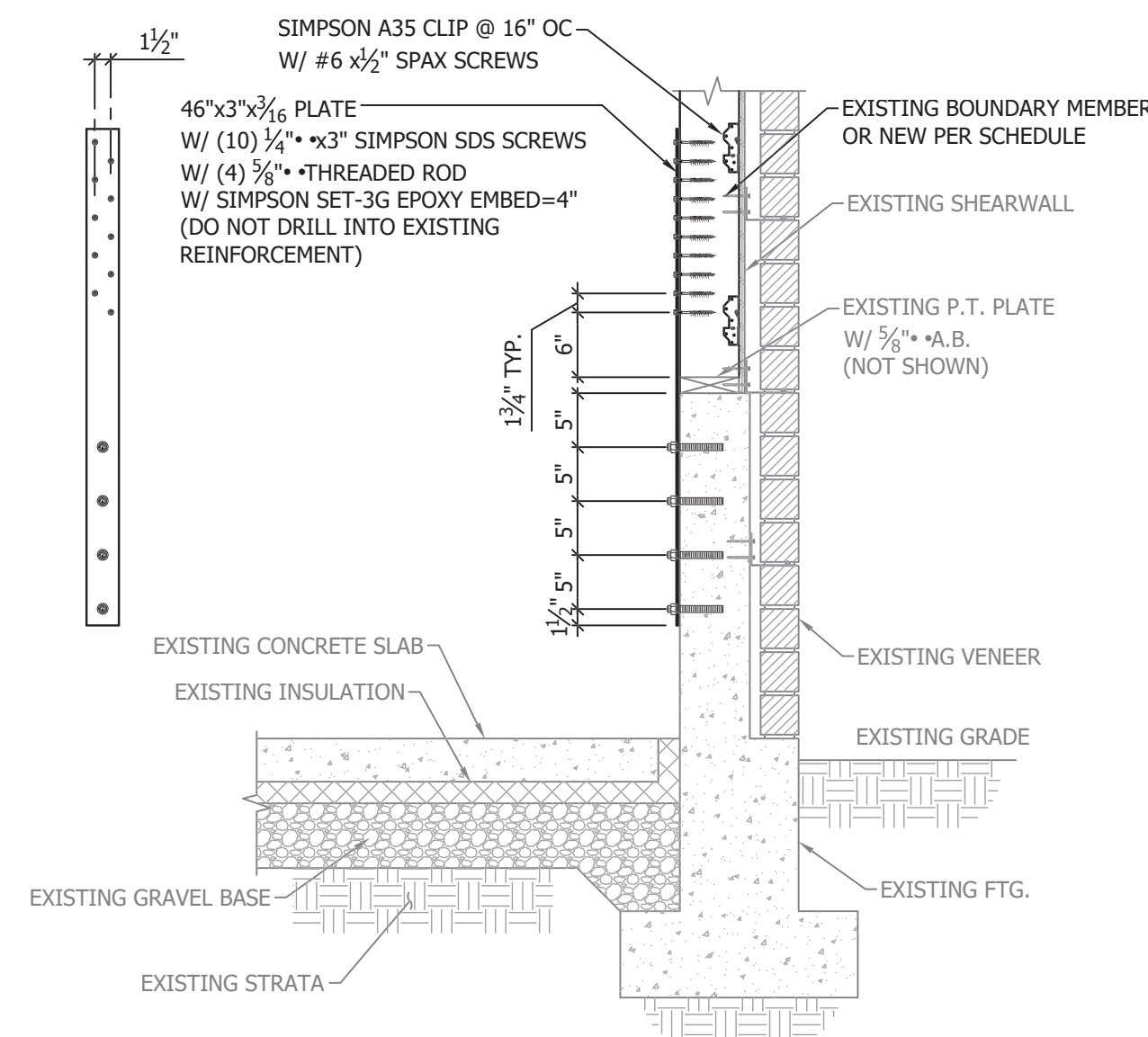
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S5.10



HOLDOWN @ EXISTING STEMWALL

3/4" = 1'-0"

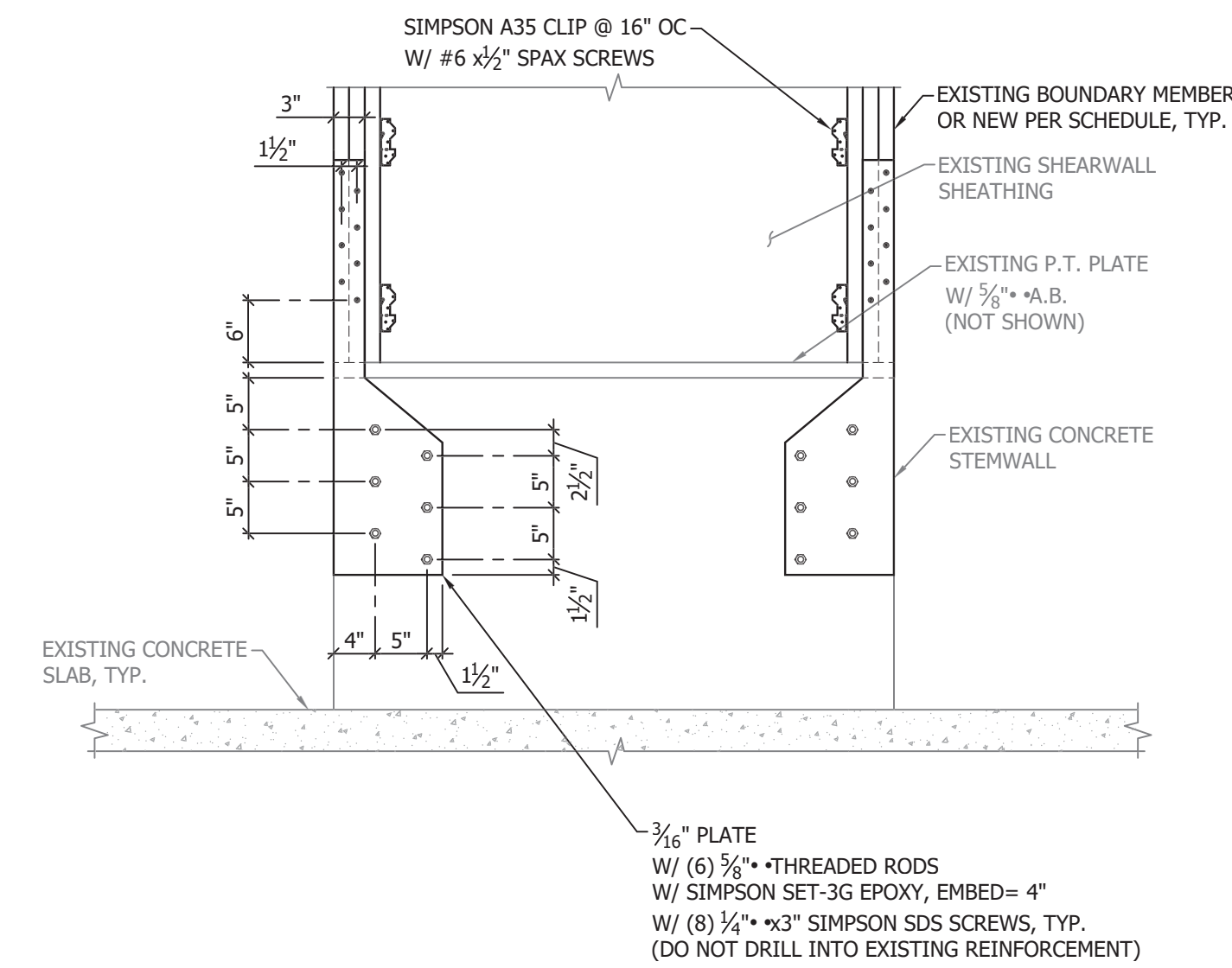
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S5.10



HOLDOWN @ EXISTING STEMWALL

3/4" = 1'-0"

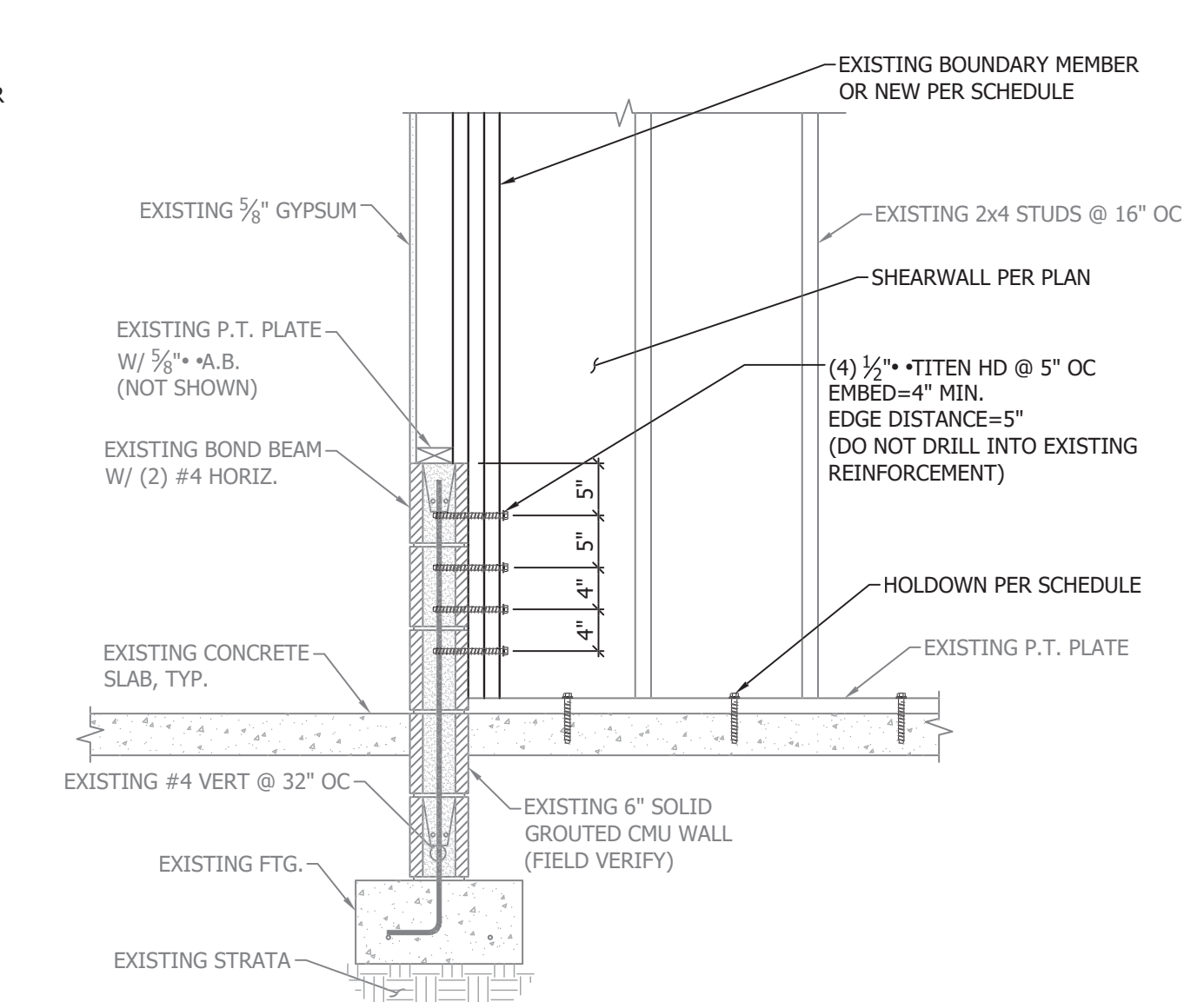
6
S5.10



HOLDOWN @ OPENINGS

3/4" = 1'-0"

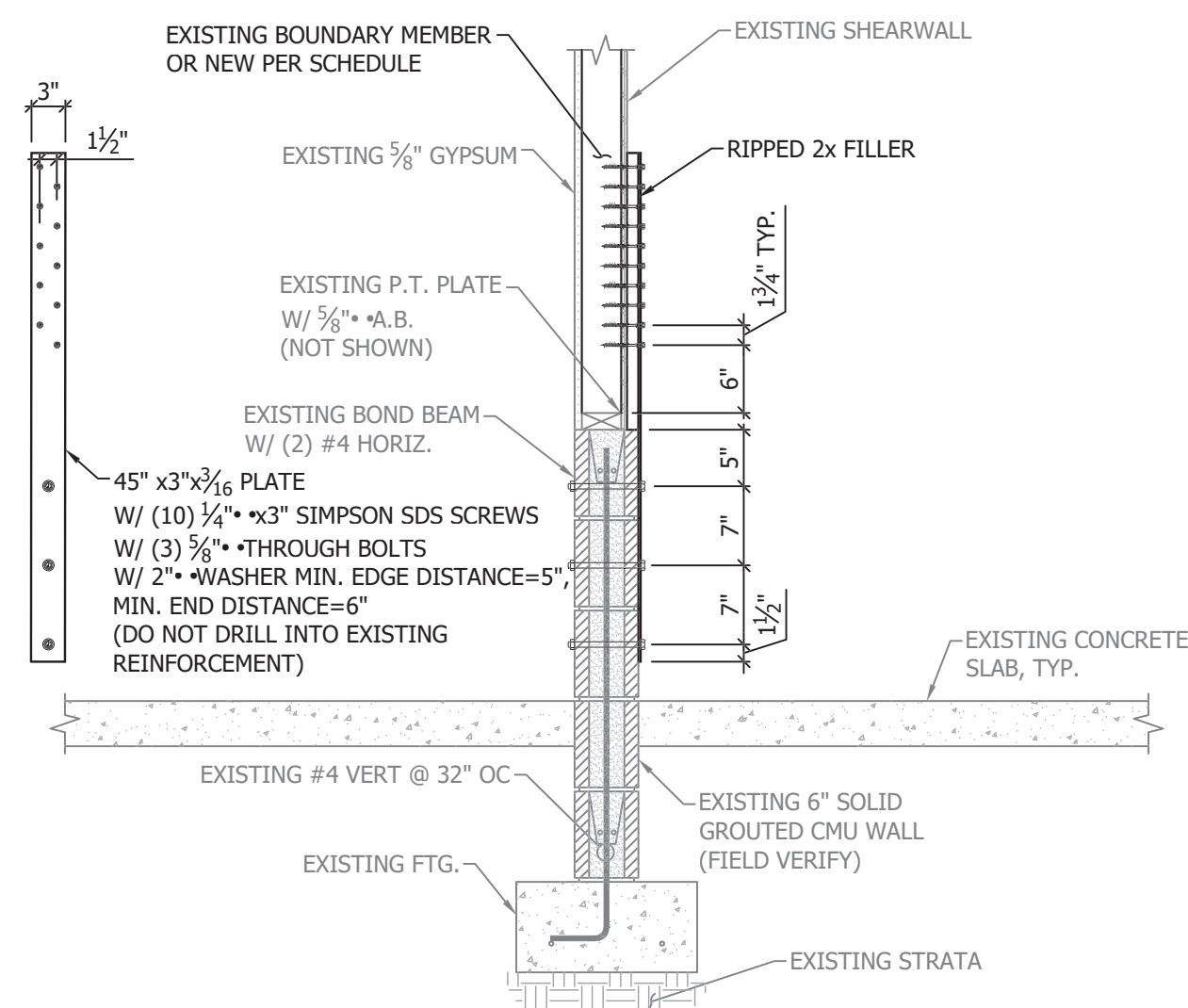
7
S5.10



HOLDOWN @ EXISTING CMU STEMWALL

3/4" = 1'-0"

8
S5.10



HOLDOWN @ EXISTING CMU STEMWALL

3/4" = 1'-0"

9
S5.10

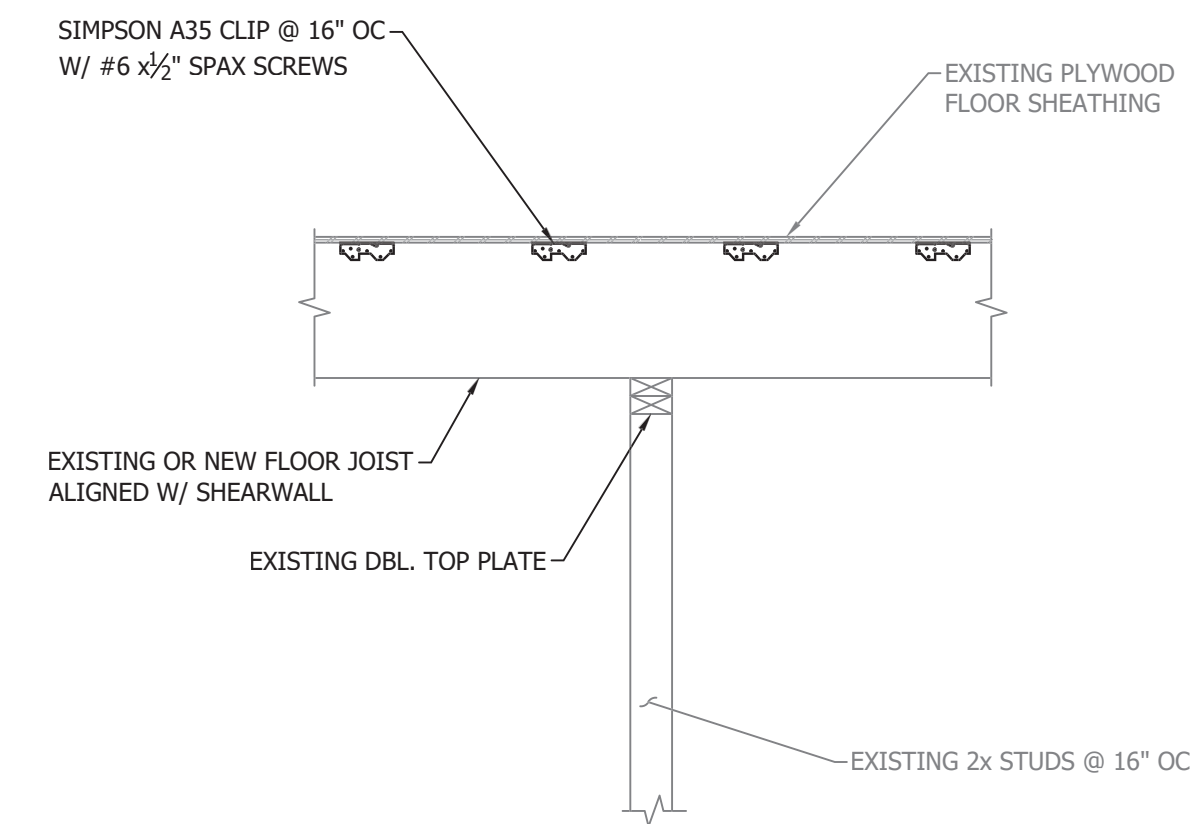
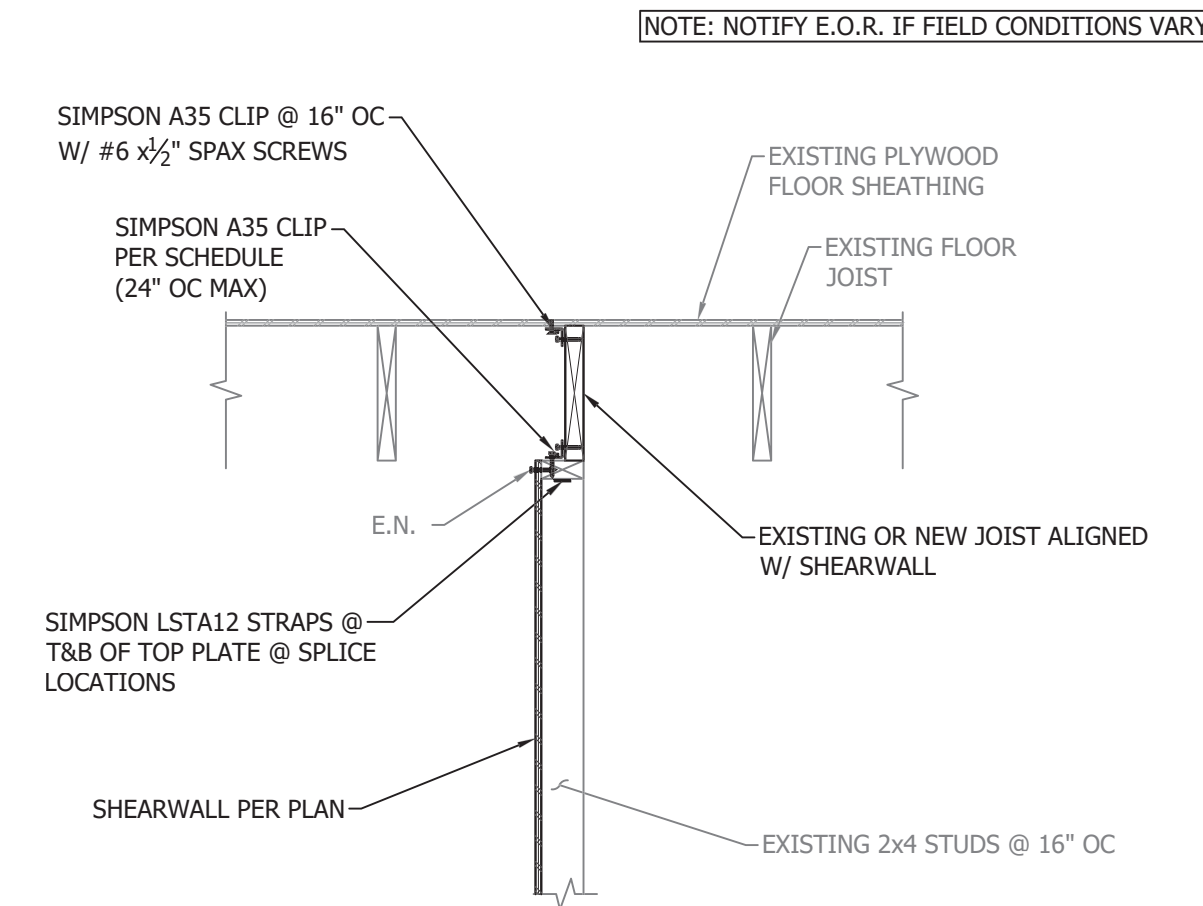
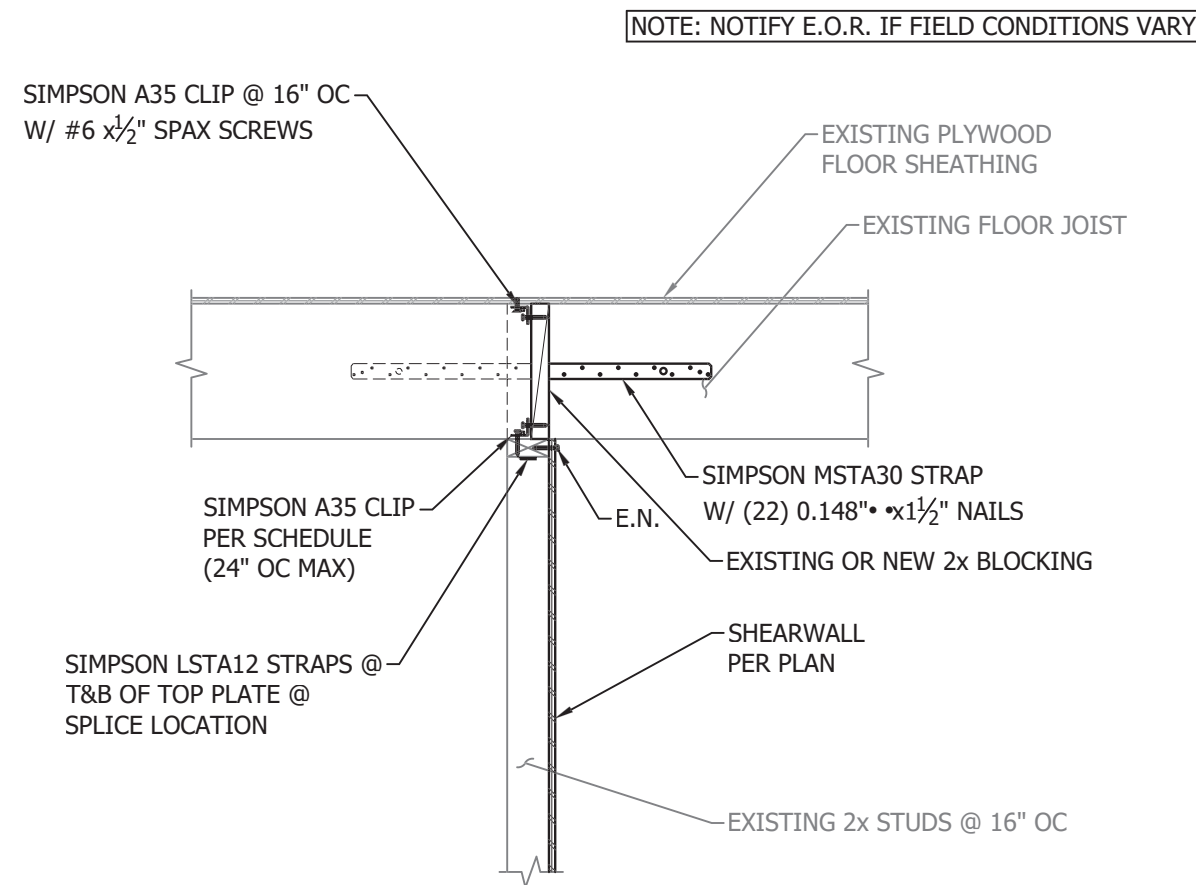
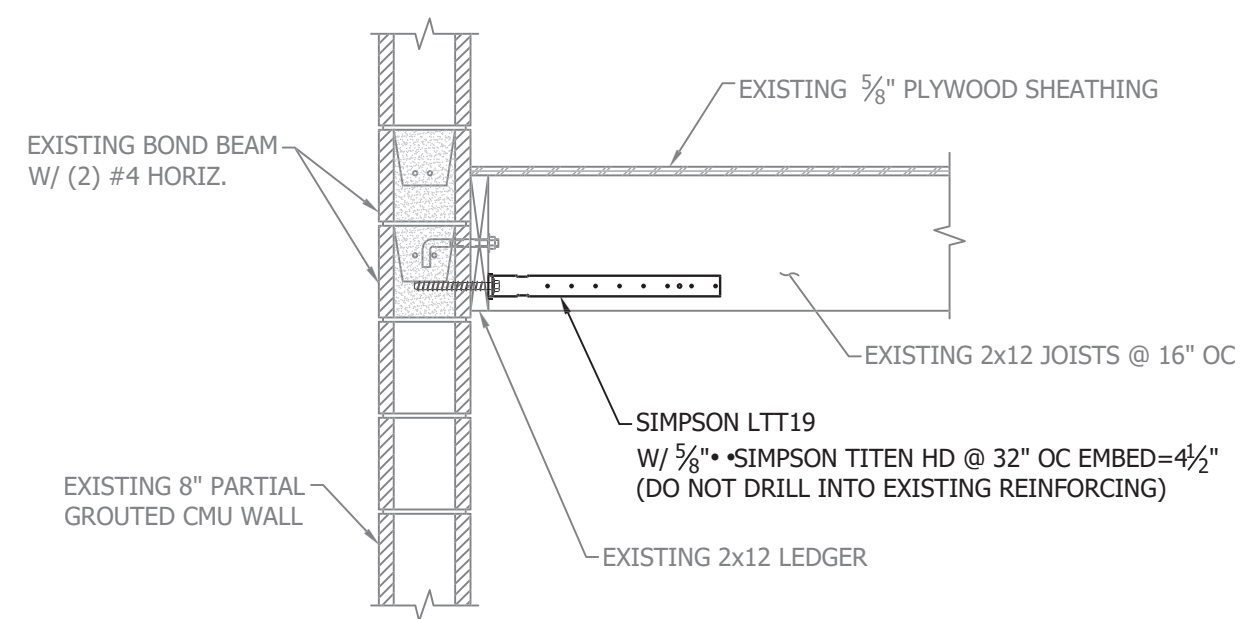
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FOUNDATION DETAILS

sheet: **S5.10**

of:



TYPICAL FLOOR ANCHORAGE

3/4" = 1'-0"

1
S7.10

TYPICAL INTERIOR SHEARWALL PERPENDICULAR TO JOISTS

3/4" = 1'-0"

2
S7.10

TYPICAL INTERIOR SHEARWALL PARALLEL TO JOISTS

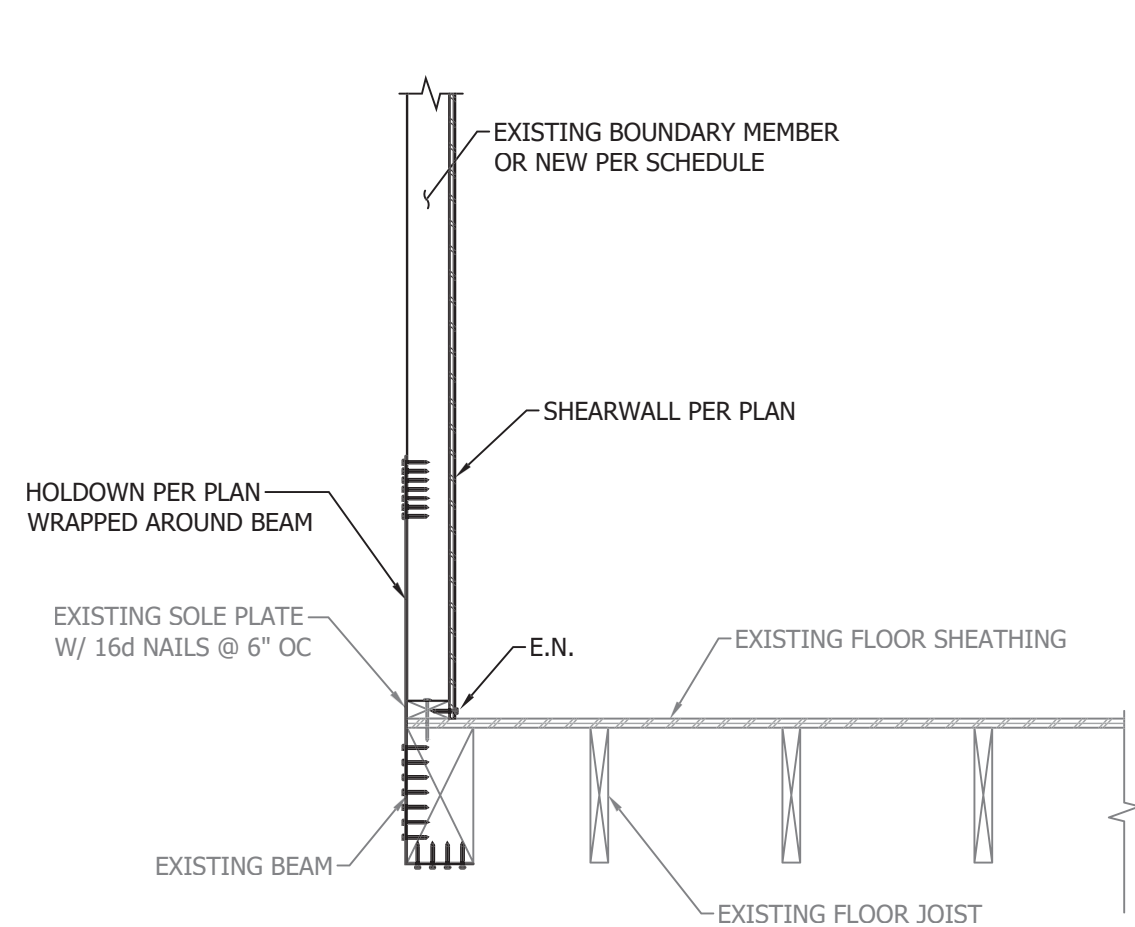
3/4" = 1'-0"

3
S7.10

TYPICAL COLLECTOR CONNECTION

3/4" = 1'-0"

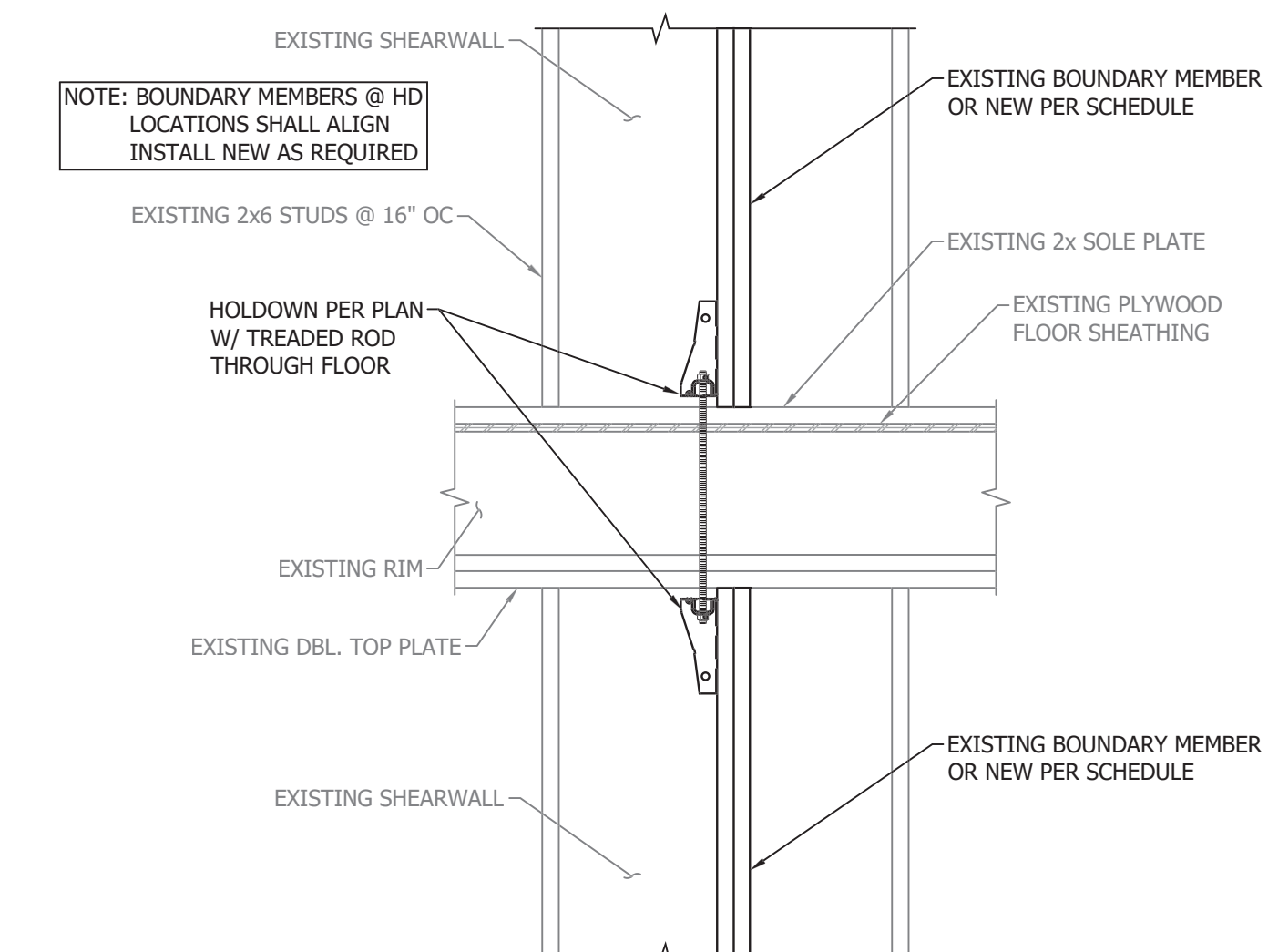
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S7.10



HOLDOWN @ BEAM

3/4" = 1'-0"

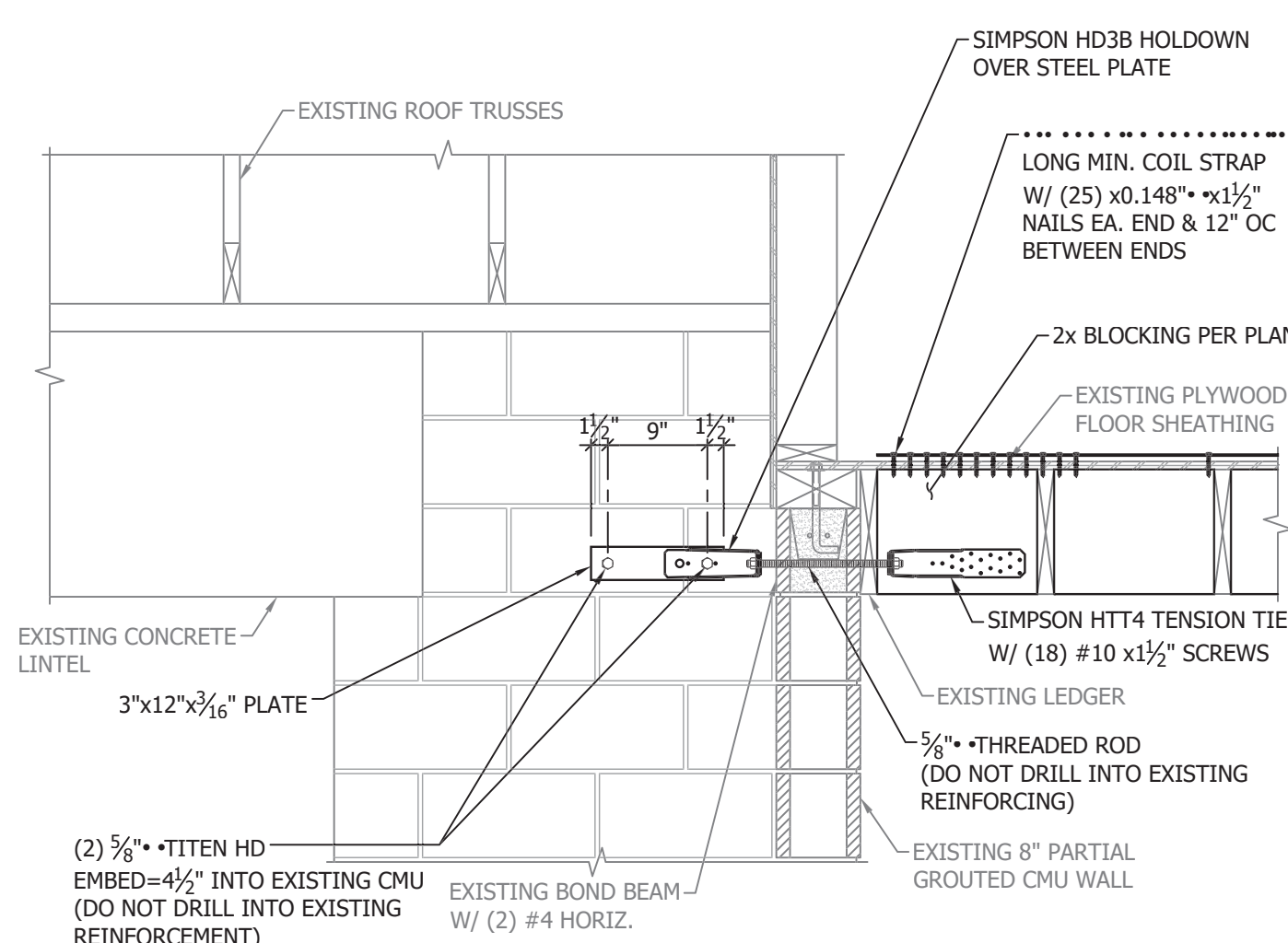
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S7.10



HOLDOWN @ BETWEEN FLOORS

3/4" = 1'-0"

6
S7.10



SHEAR TRANSFER @ EXISTING CMU WALL

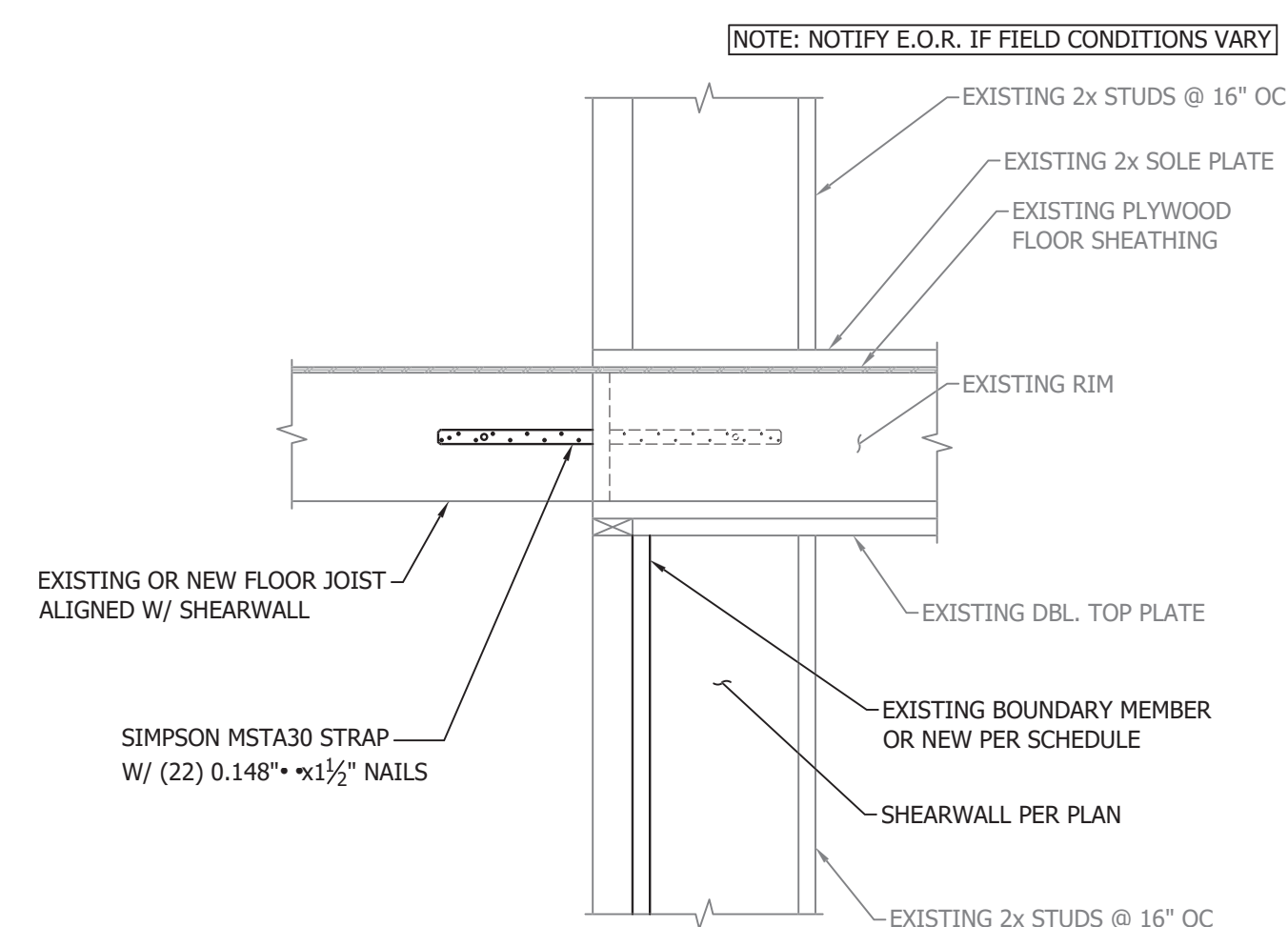
3/4" = 1'-0"

7
S7.10

SHEAR TRANSFER @ EXISTING BEARING WALL

3/4" = 1'-0"

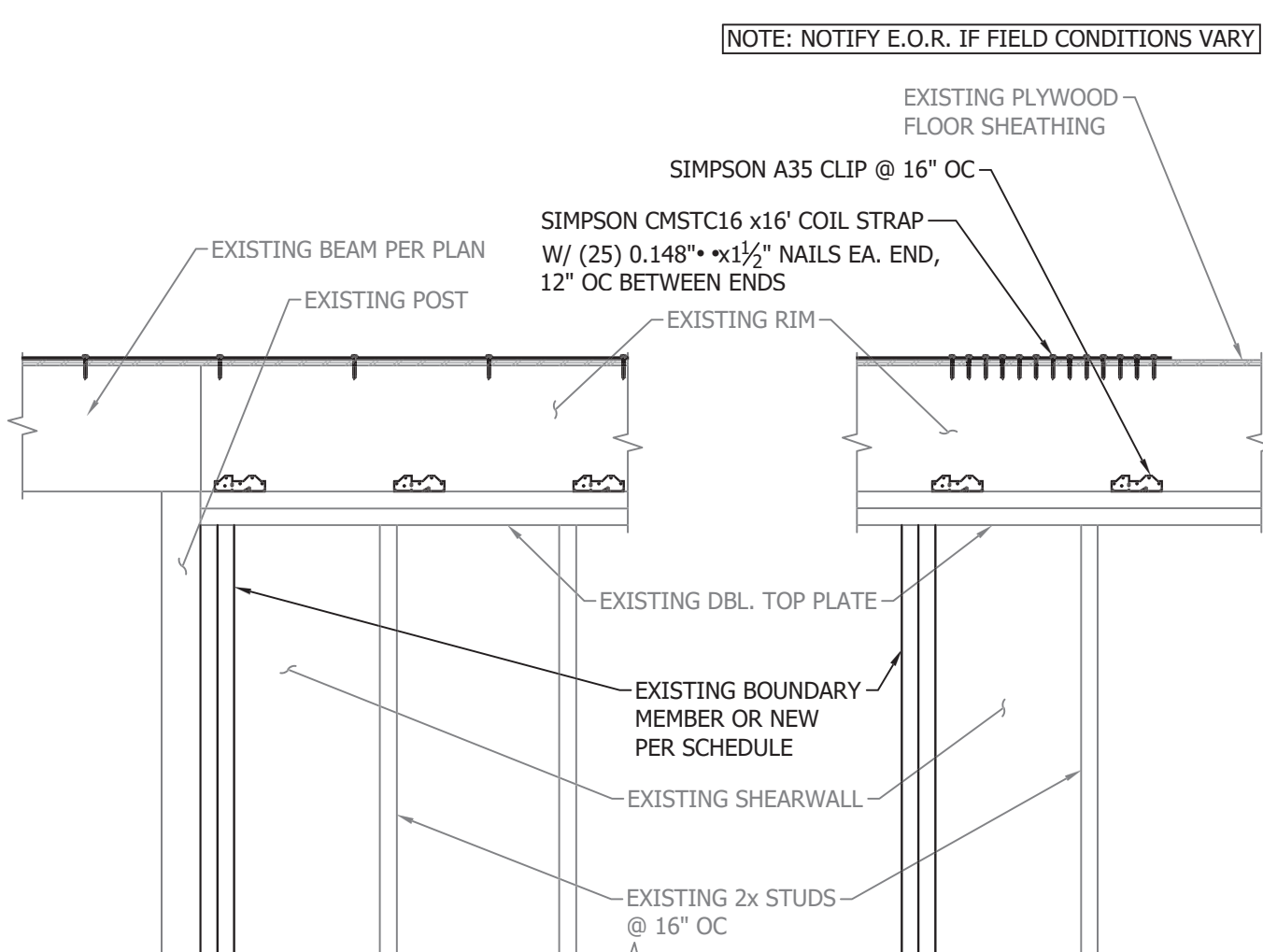
8
S7.10



SHEAR TRANSFER @ STAIRS

3/4" = 1'-0"

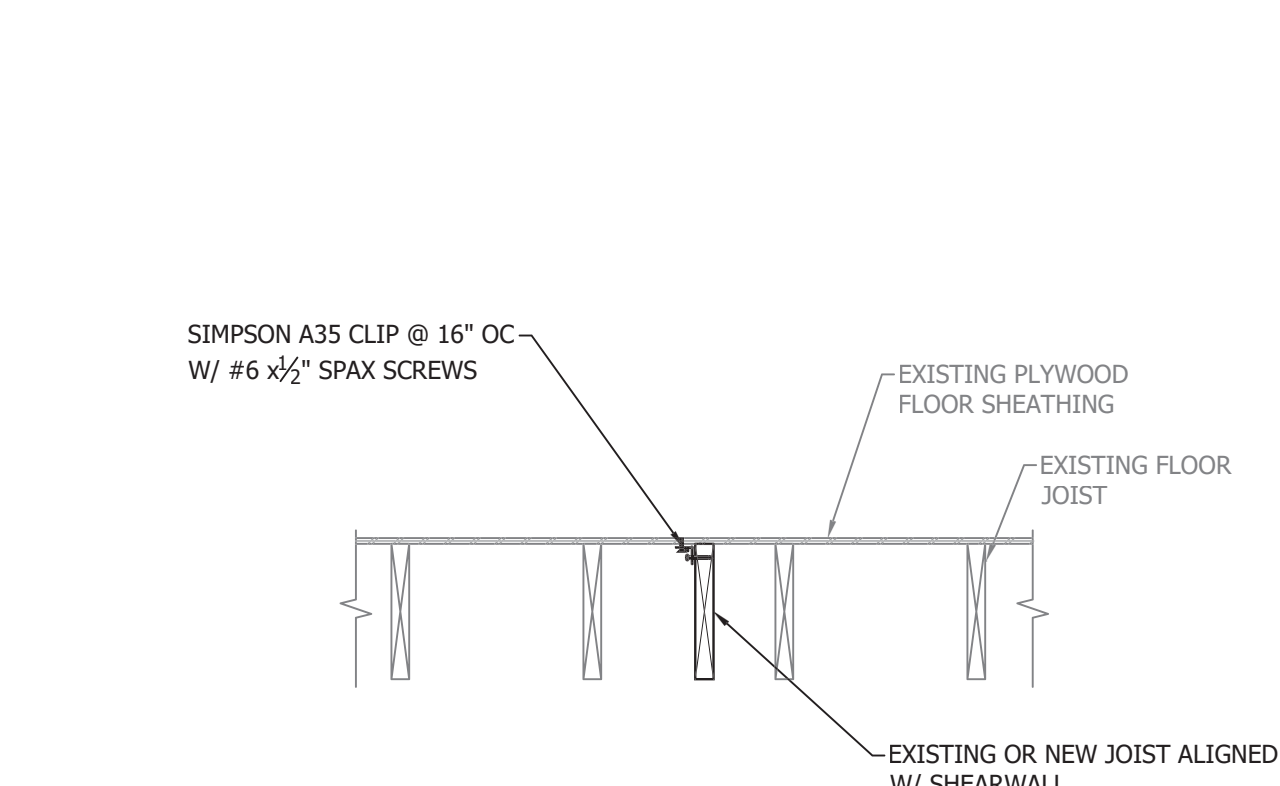
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S7.10



SHEAR TRANSFER TO EXISTING SHEARWALL

3/4" = 1'-0"

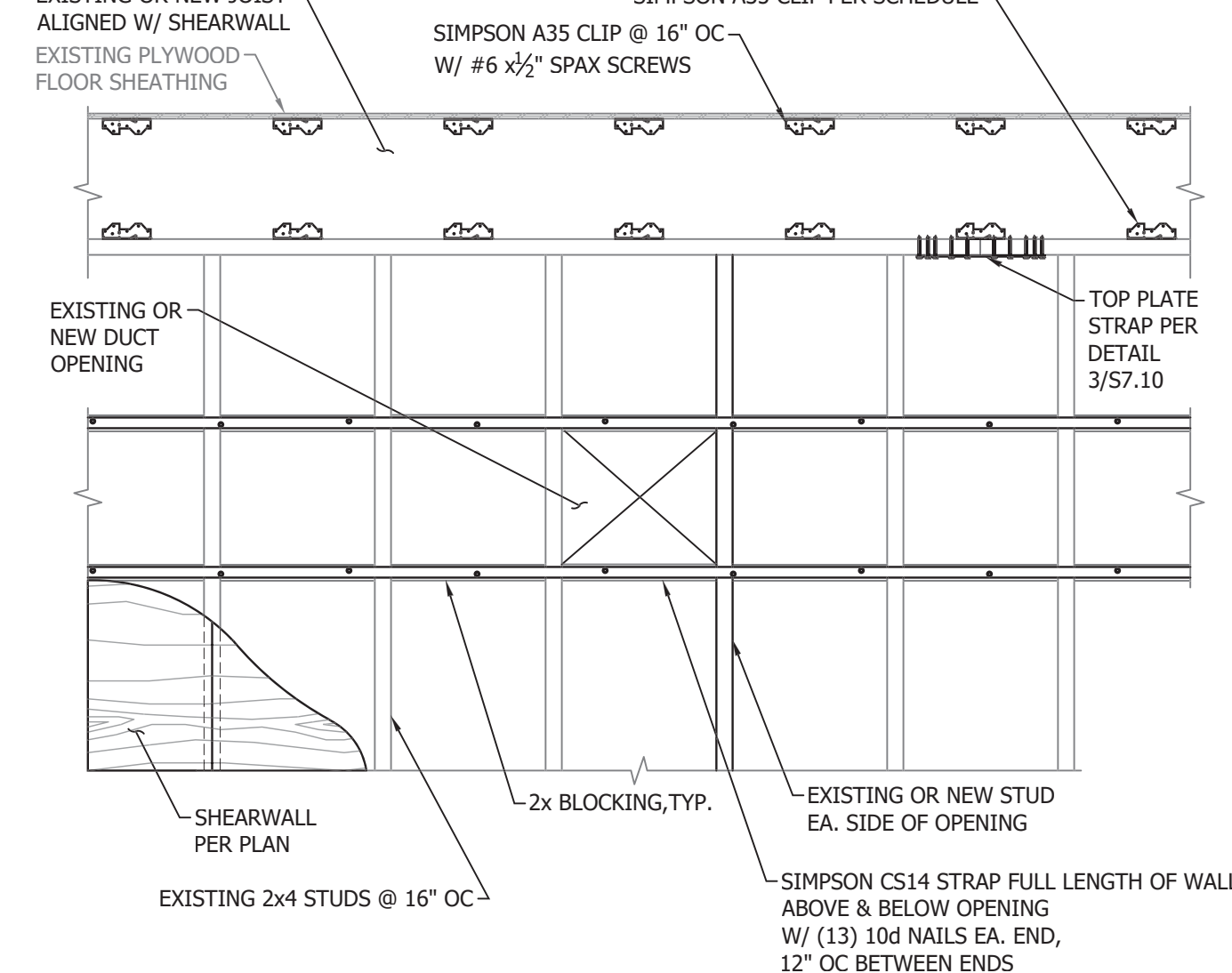
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S7.10



SHEAR TRANSFER @ COLLECTOR

3/4" = 1'-0"

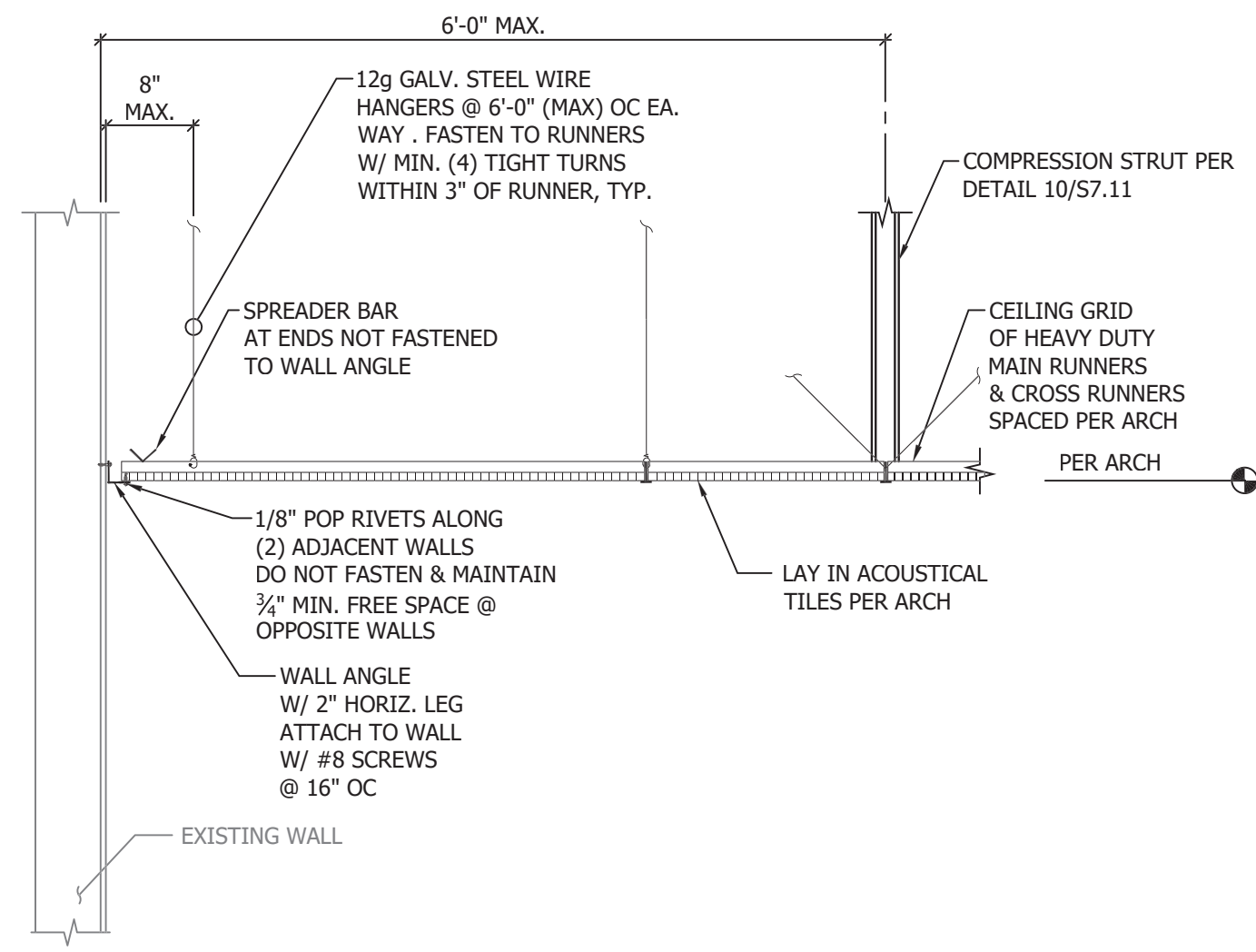
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DUCT OPENING @ SHEARWALL

3/4" = 1'-0"

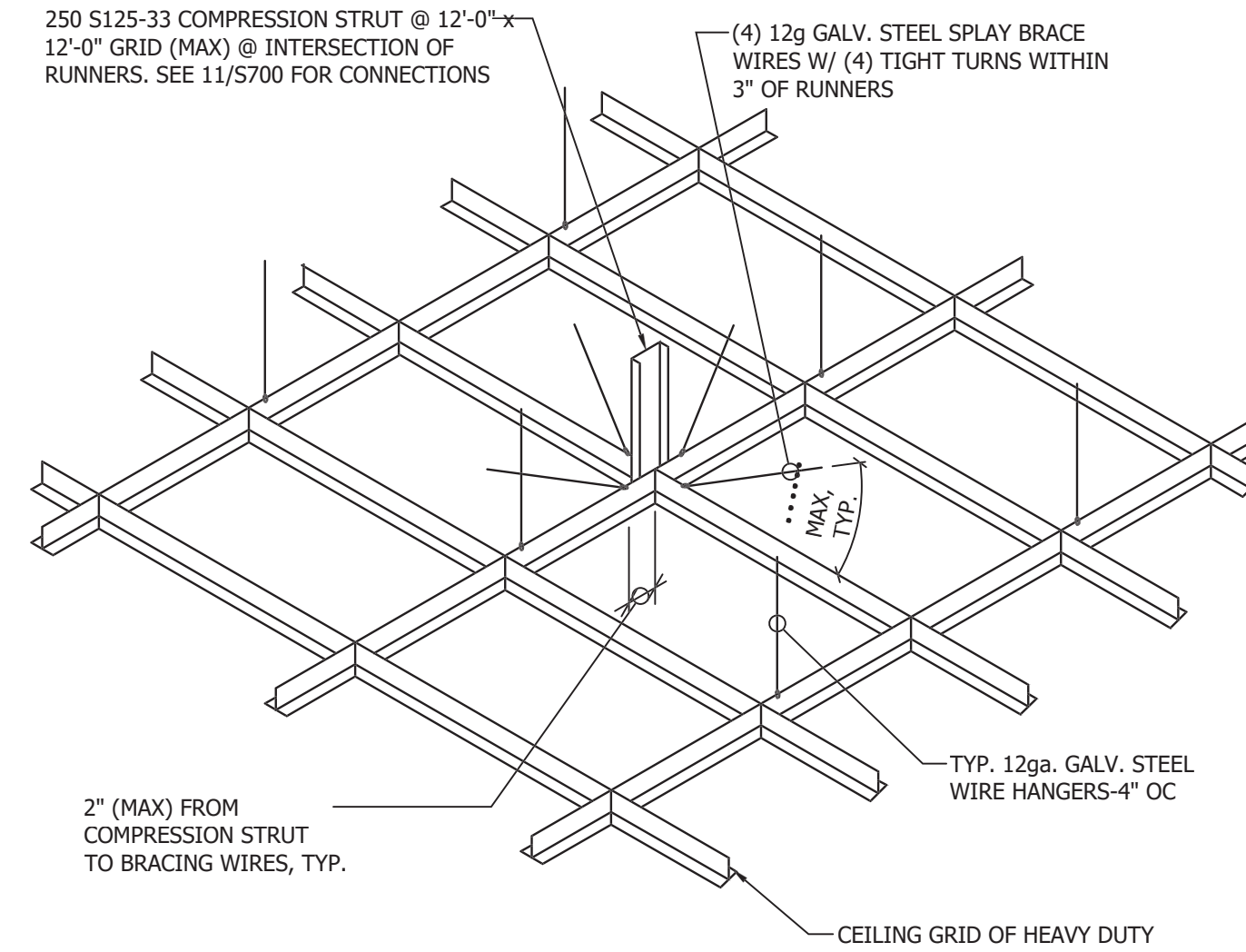
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SUSPENDED ACOUSTICAL TILE CEILING SYSTEM

3/4" = 1'-0"

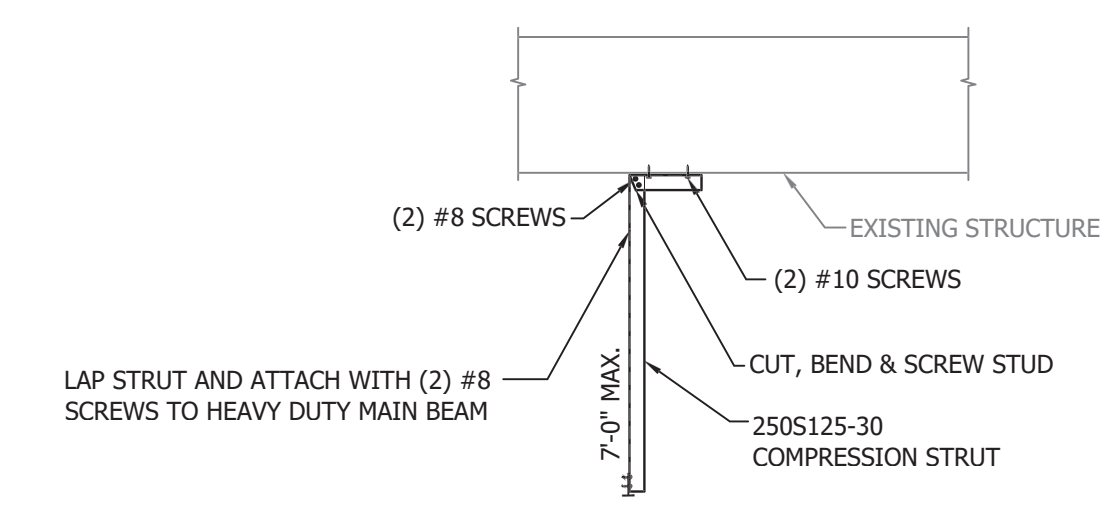
1
S7.11



SUSPENDED ACOUSTICAL TILE CEILING GRID

3/4" = 1'-0"

2
S7.11

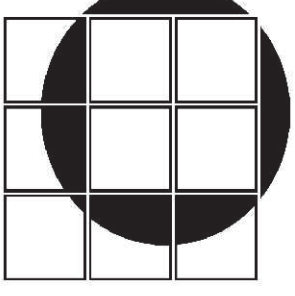


TYPICAL COMPRESSION STRUT

3/4" = 1'-0"

3
S7.11

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SHERIDAN, OREGON 97378

consultants: **MSC**
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1000 Commercial Place NE
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mscengineers.com

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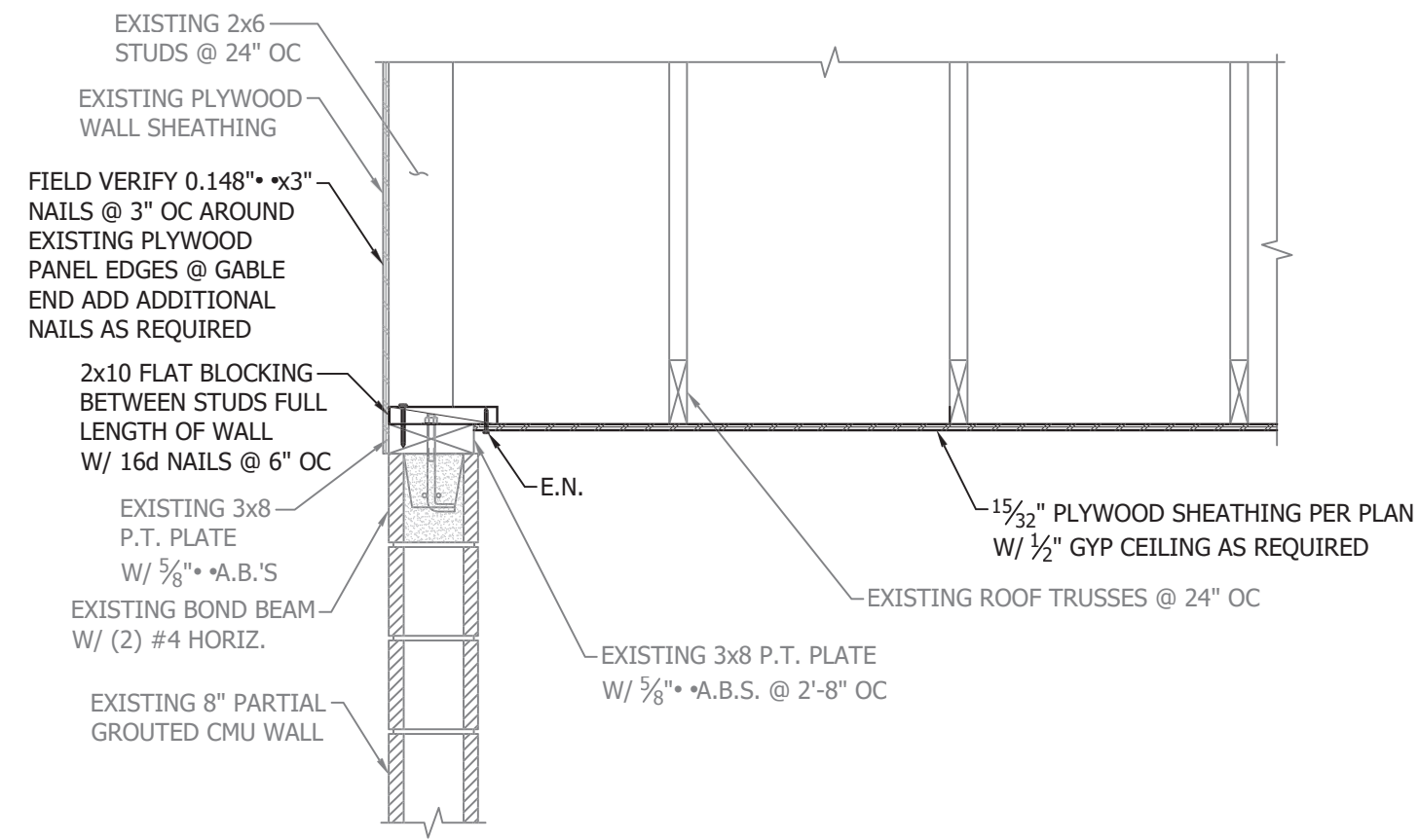
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FLOOR FRAMING
DETAILS

sheet: **S7.11**

of:

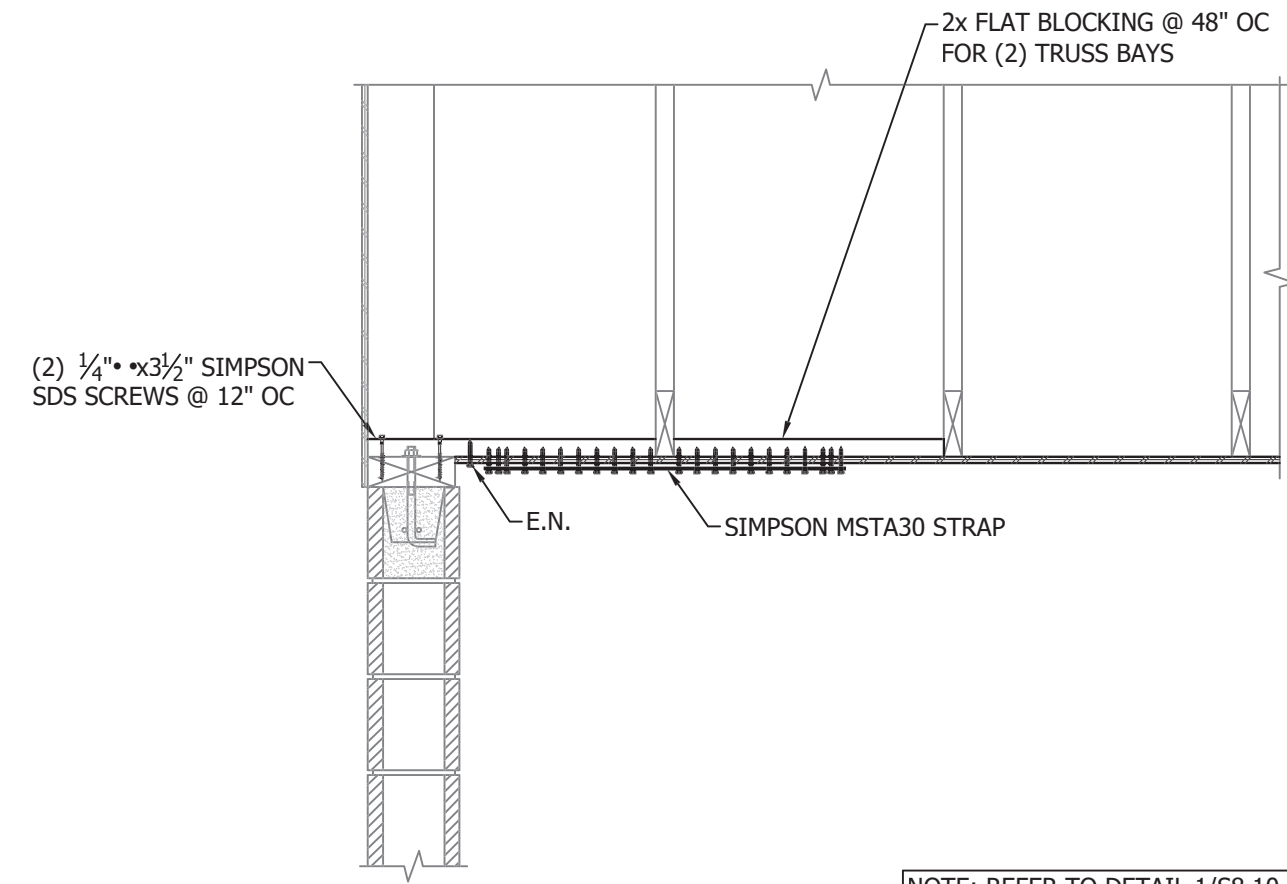
NOTE: NOTIFY E.O.R. IF FIELD CONDITIONS VARY



TYPICAL ANCHORAGE @ GABLE END

3/4" = 1'-0"

1
S8.10

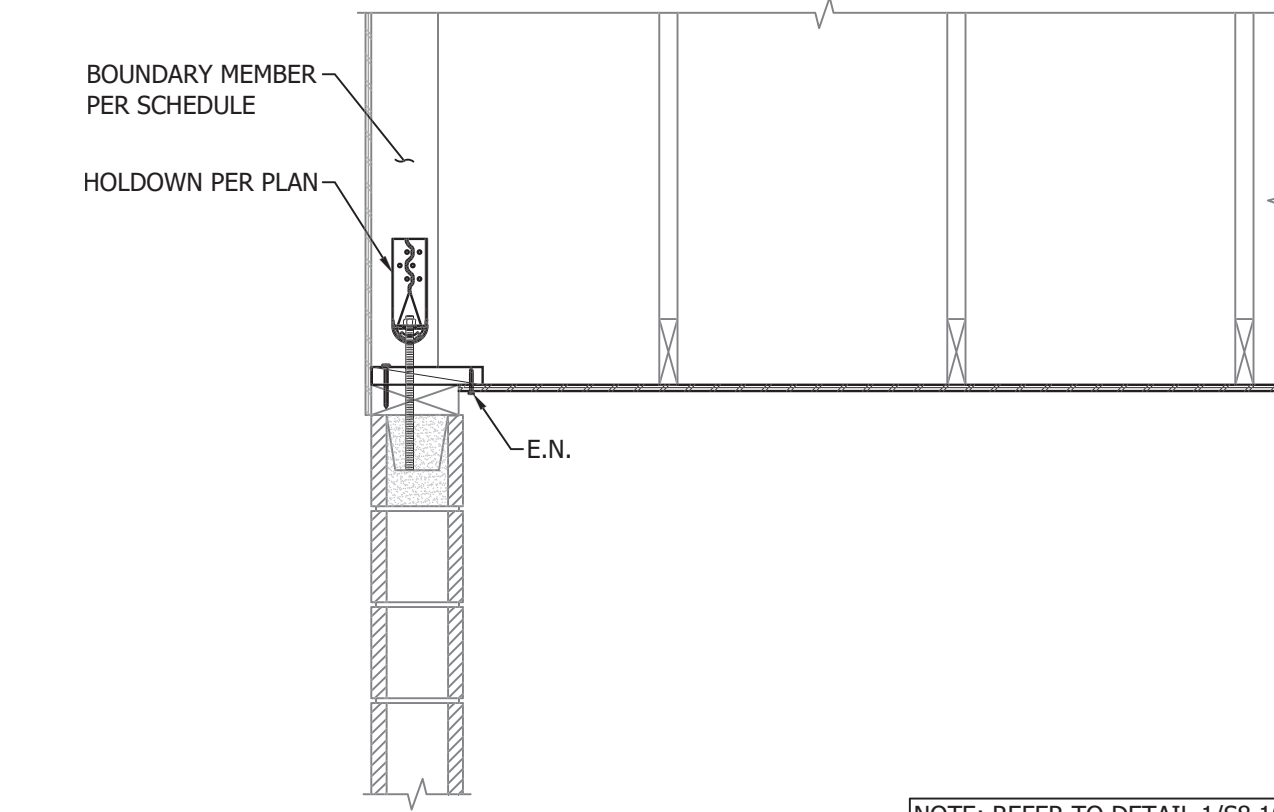


TYPICAL SHEARWALL @ GABLE END

3/4" = 1'-0"

2
S8.10

NOTE: REFER TO DETAIL 1/S8.10 FOR ADDITIONAL INFORMATION

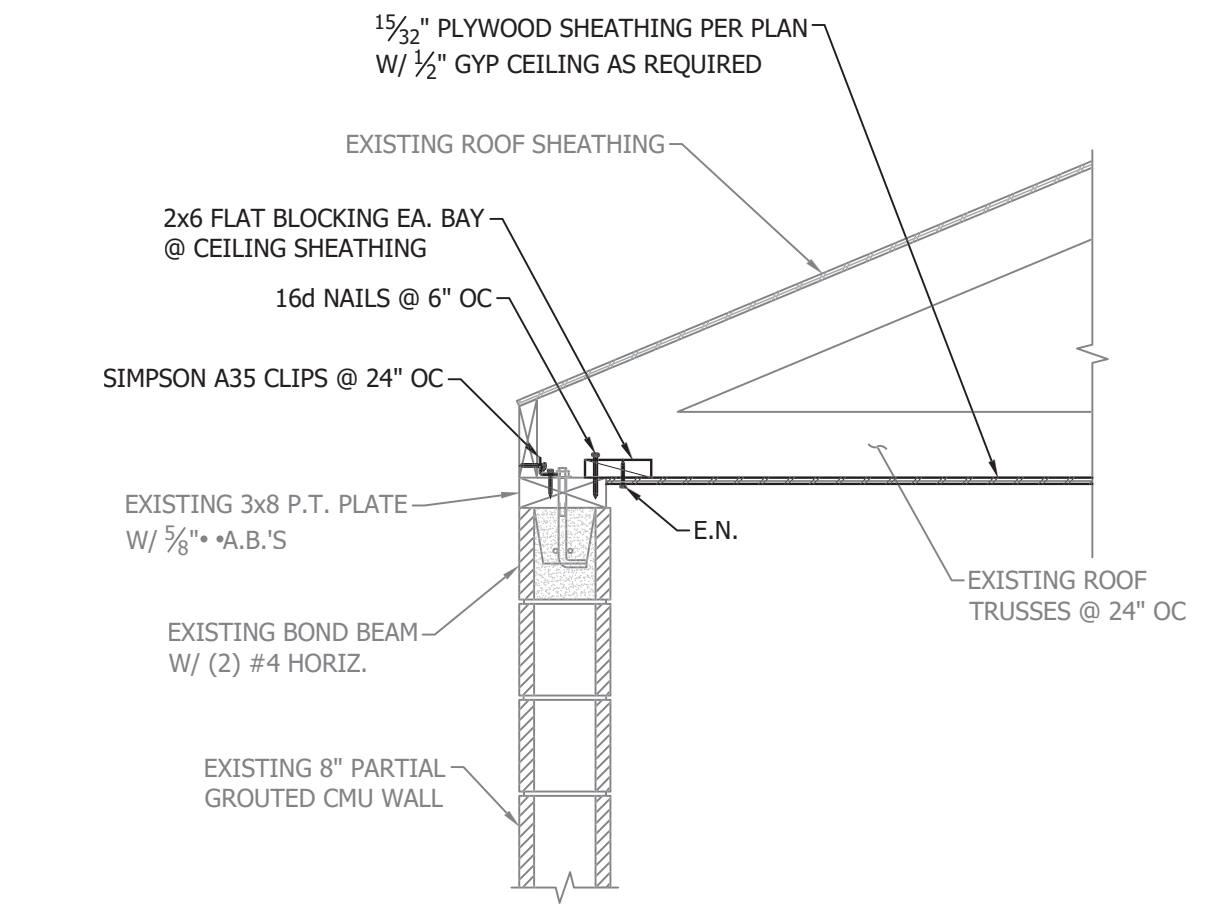


TYPICAL HOLDOWN @ GABLE END

3/4" = 1'-0"

3
S8.10

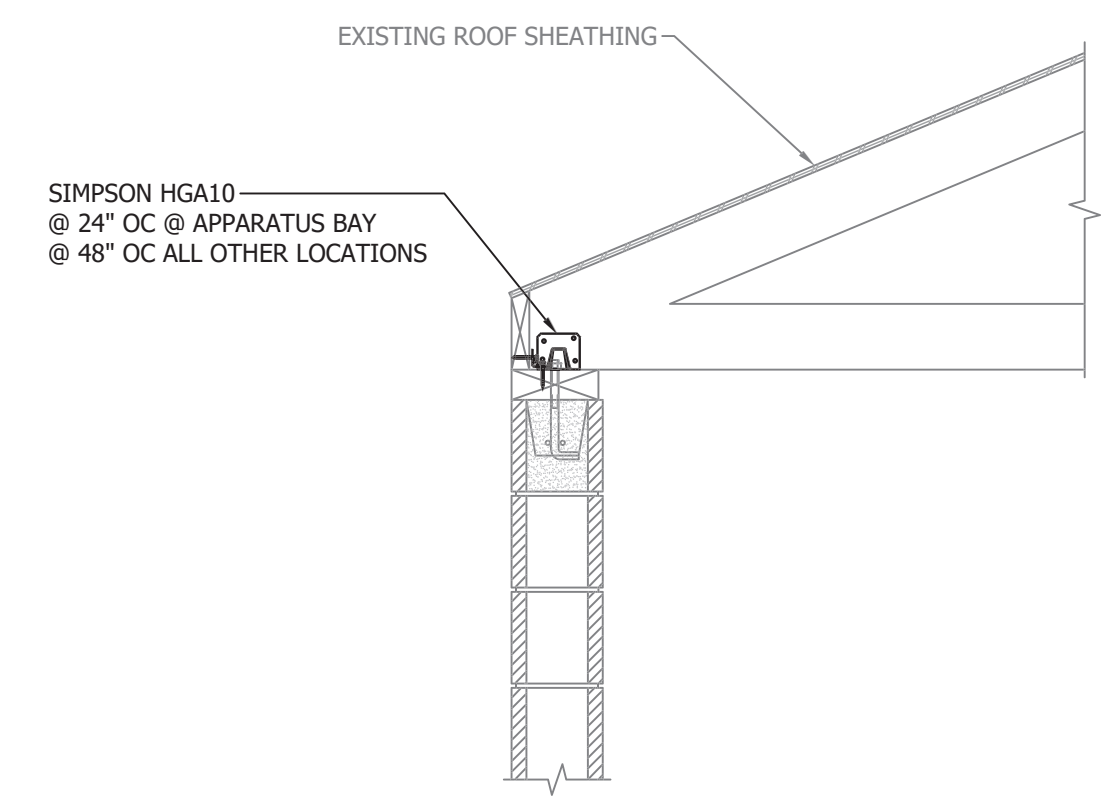
NOTE: REFER TO DETAIL 1/S8.10 FOR ADDITIONAL INFORMATION



ROOF TRUSS CONNECTION

3/4" = 1'-0"

4
S8.10

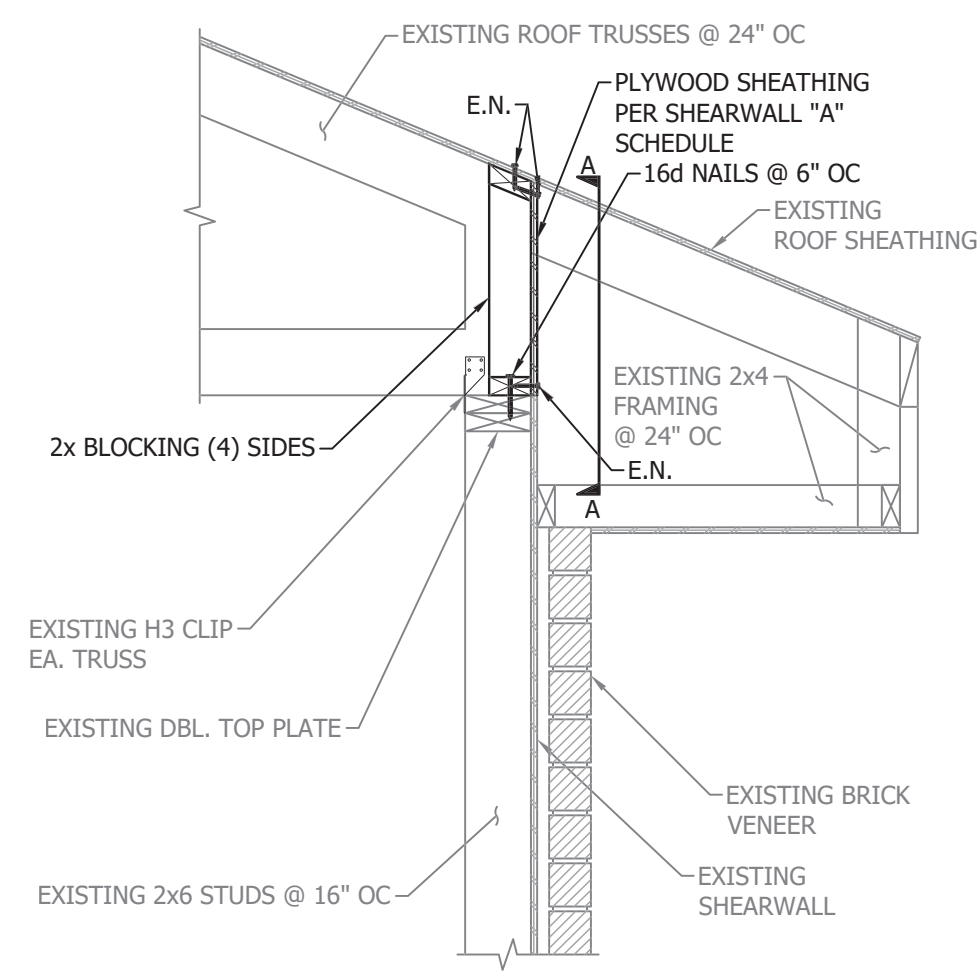


TYPICAL ANCHORAGE @ CMU WALL

3/4" = 1'-0"

5
S8.10

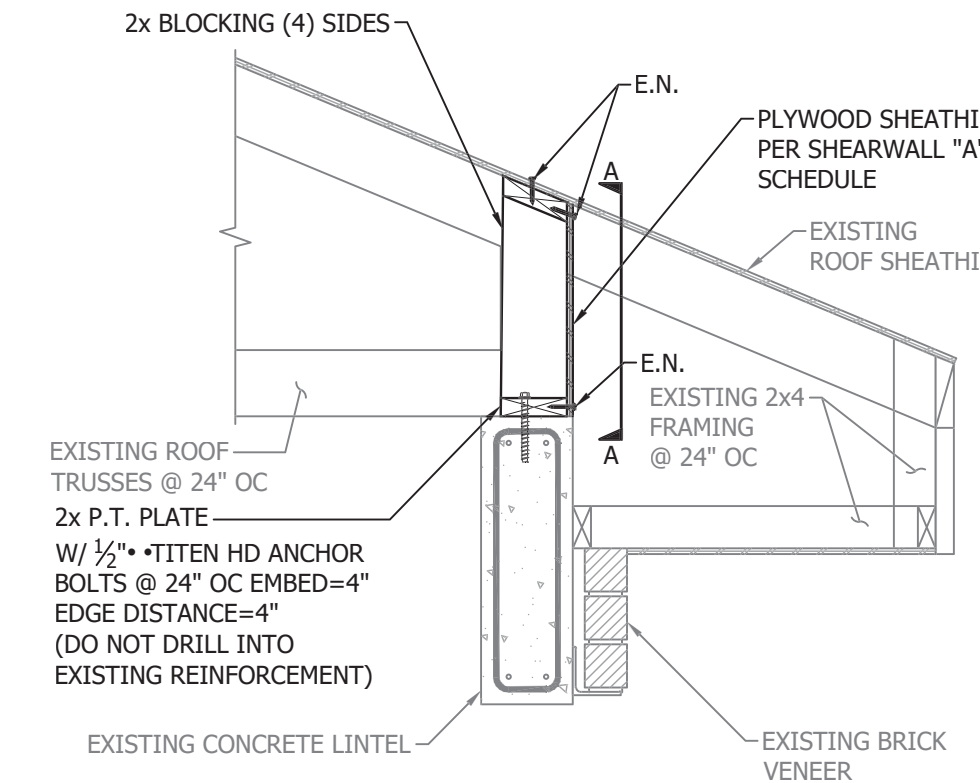
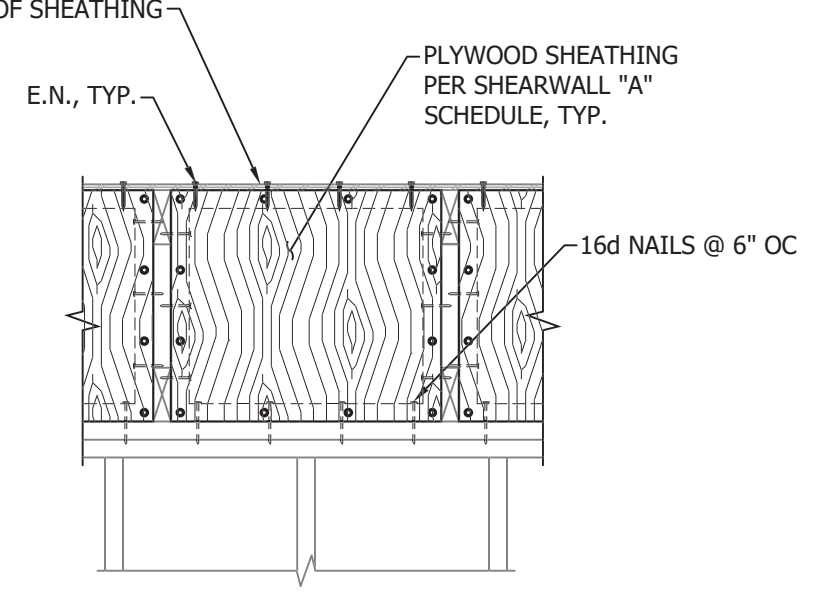
NOTE: REFER TO DETAIL 3/S8.10 FOR ADDITIONAL INFORMATION



SHEAR TRANSFER @ EXISTING WALL

3/4" = 1'-0"

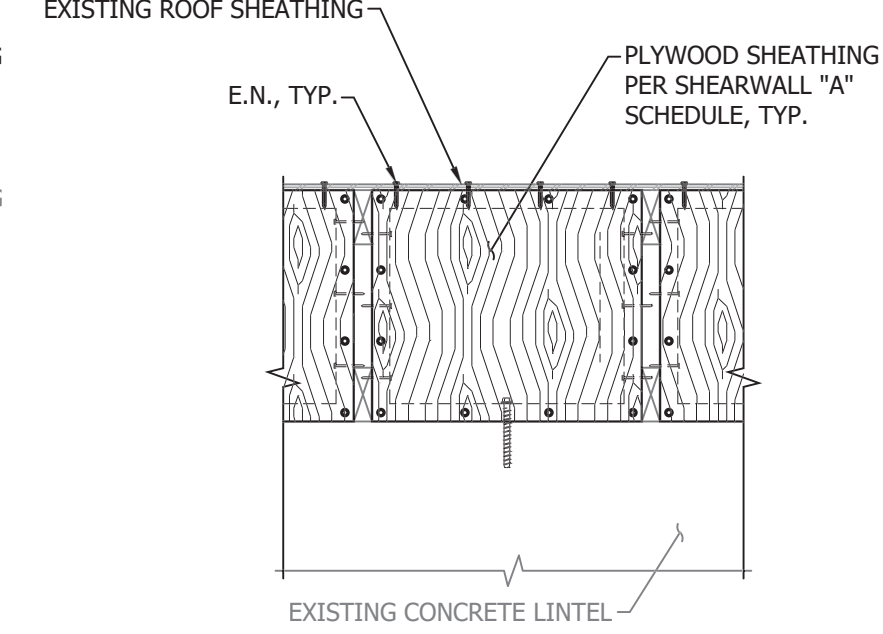
SECTION A-A



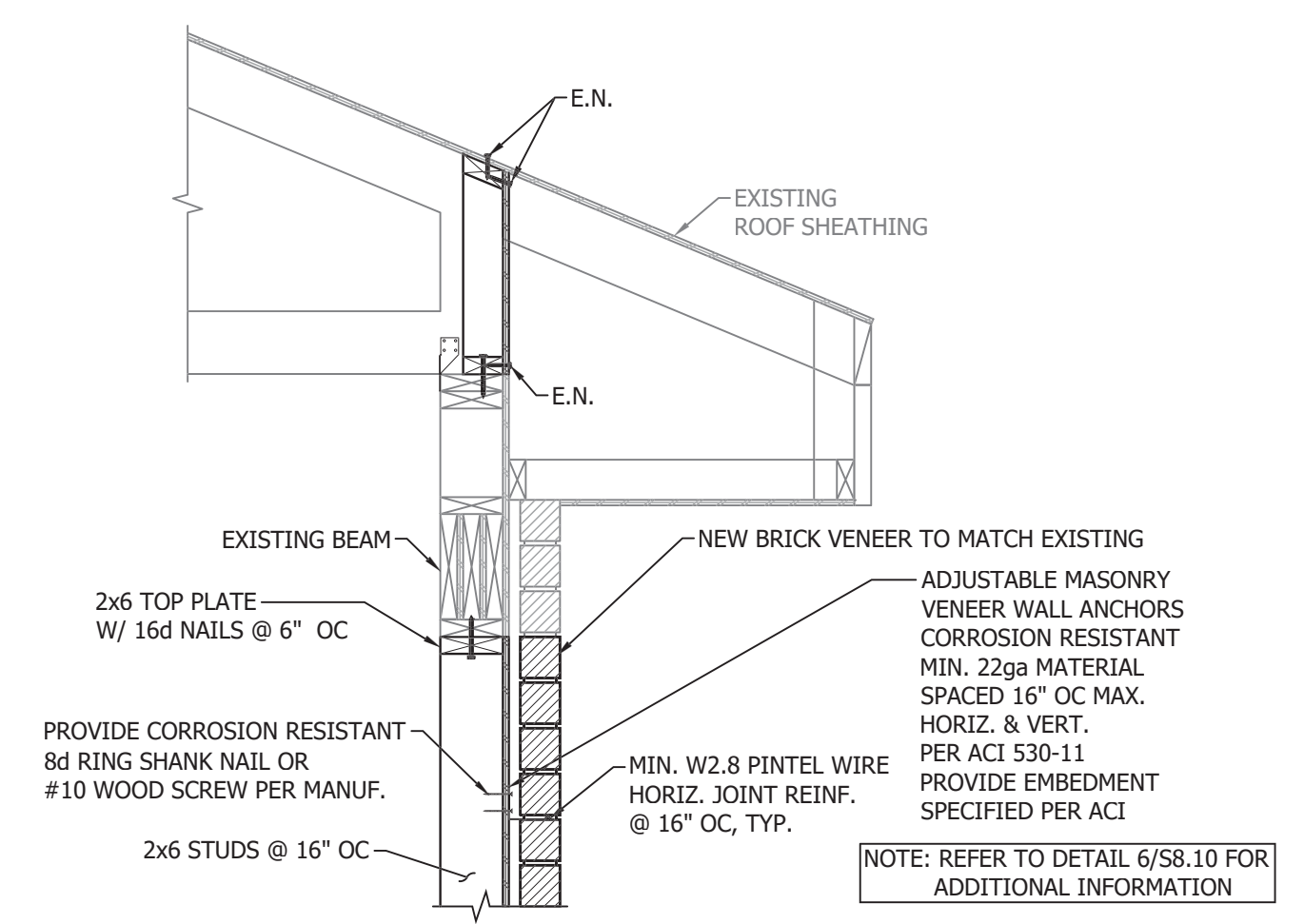
SHEAR TRANSFER @ APPARATUS BAY

3/4" = 1'-0"

SECTION A-A



7
S8.10

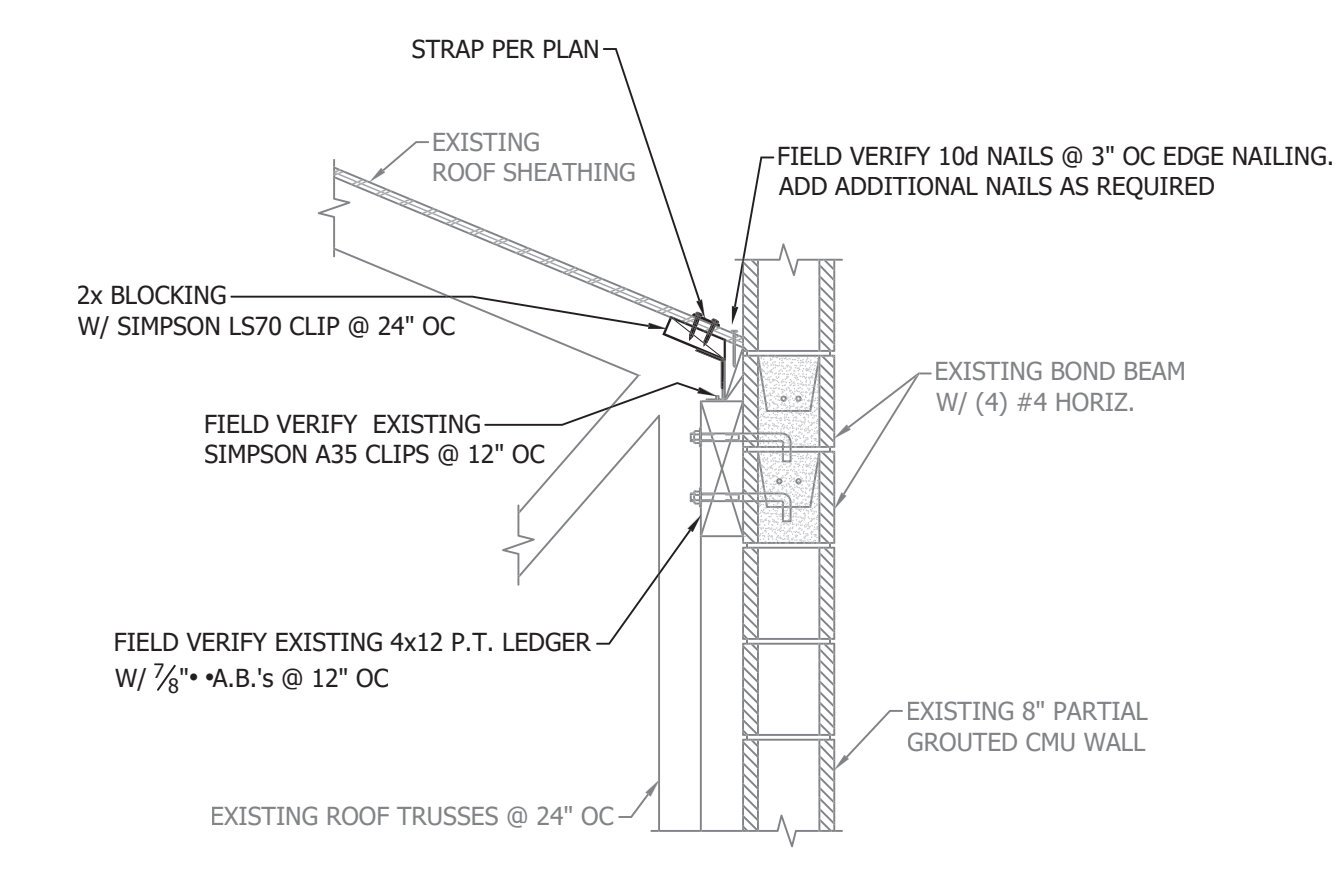


TYPICAL WALL INFILL @ EXISTING OPENING

3/4" = 1'-0"

8
S8.10

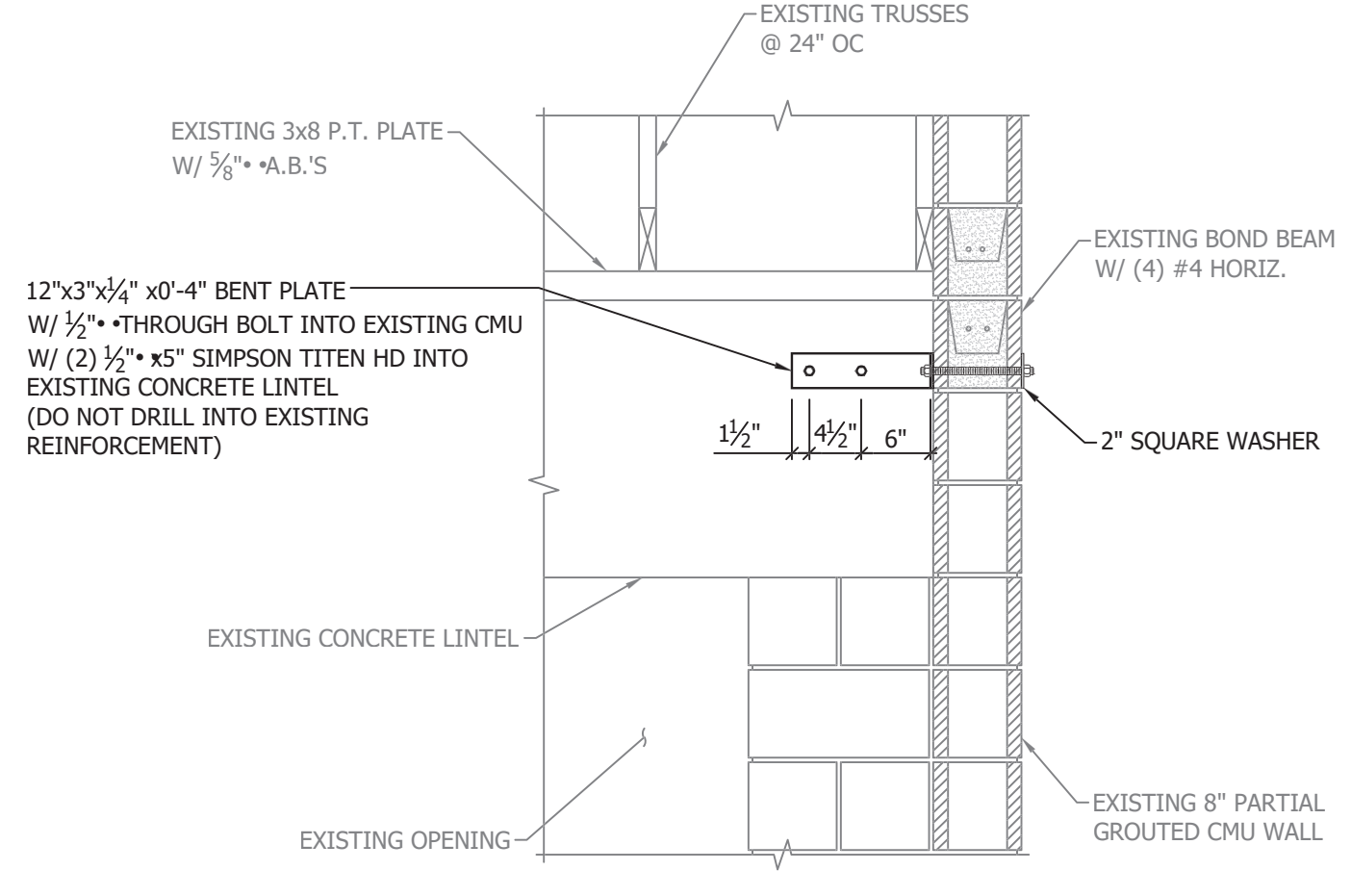
NOTE: REFER TO DETAIL 6/S8.10 FOR ADDITIONAL INFORMATION



SHEAR TRANSFER @ HOSE TOWER

3/4" = 1'-0"

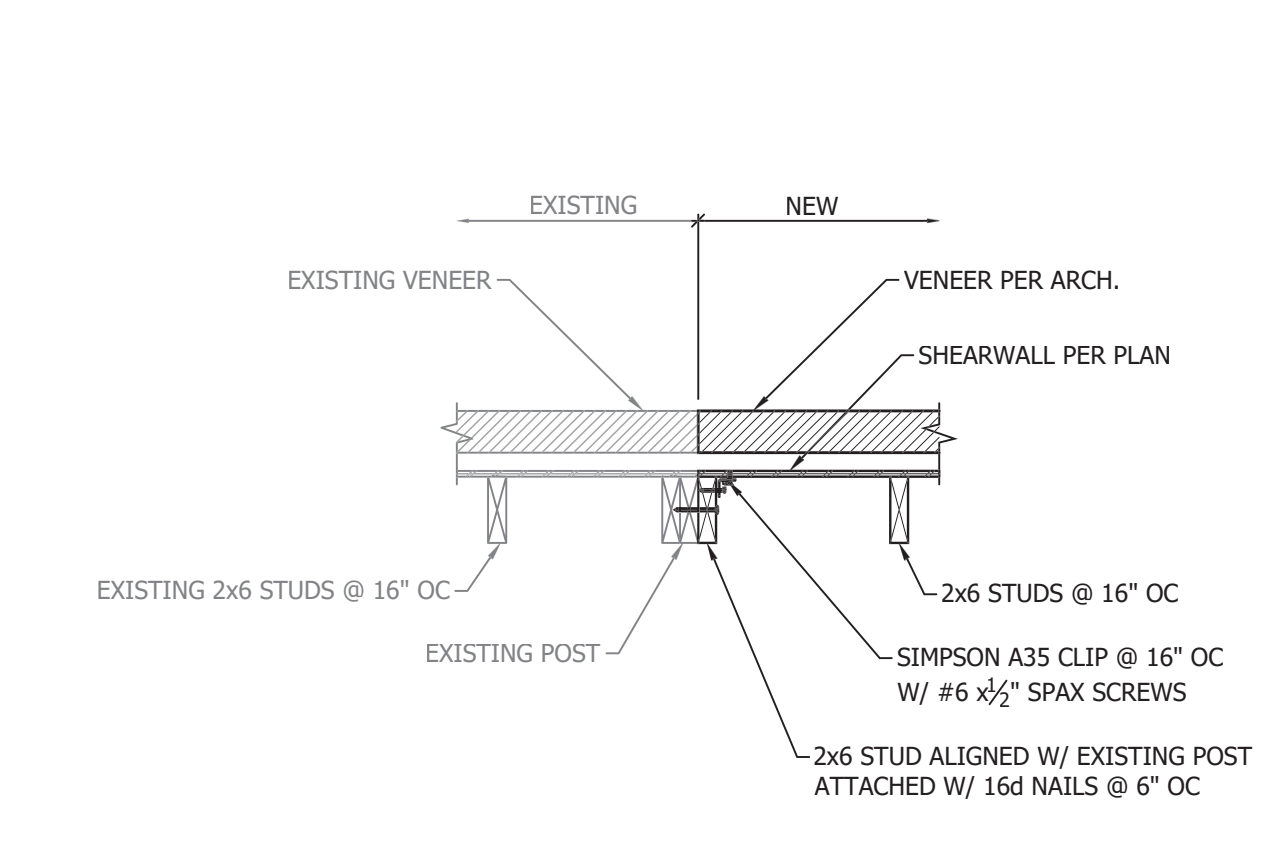
9
S8.10



SEISMIC ANCHORAGE

3/4" = 1'-0"

10
S8.10



INFILL @ EXISTING WINDOW OPENING

3/4" = 1'-0"

11
S8.10

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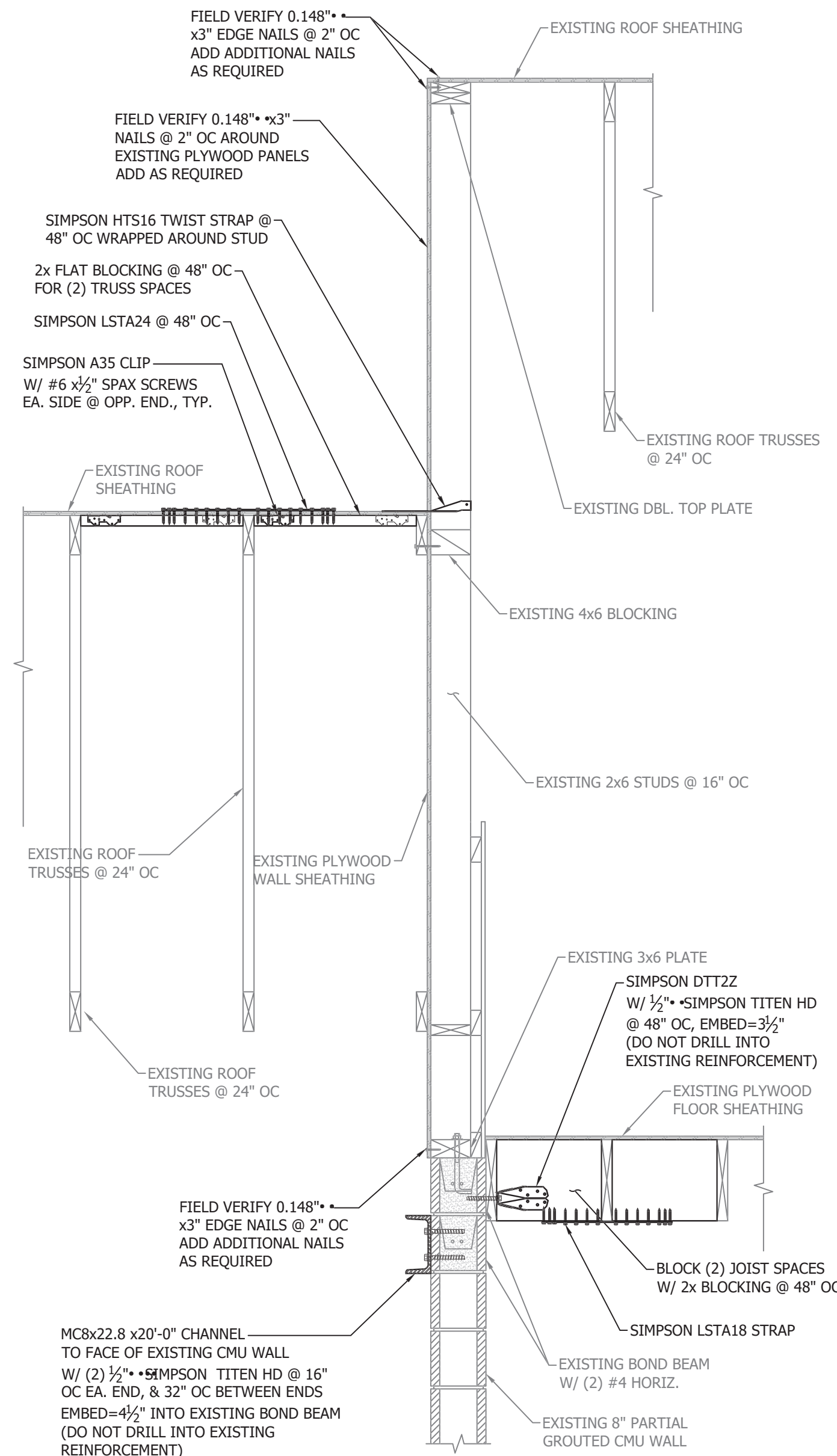
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ROOF FRAMING DETAILS

sheet: S8.10
of:



SECTION BETWEEN ONE & TWO STORY

3/4" = 1'-0"

1
S8.11



NEW SHEARWALL @ TRAINING ROOM

3/4" = 1'-0"

2
S8.11

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MAY 19, 1999

DOUGLAS S. WELTER

EXPIRES: DEC. 31, 2022

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consultants: MSC ENGINEERS

CONSULTING STRUCTURAL ENGINEERS

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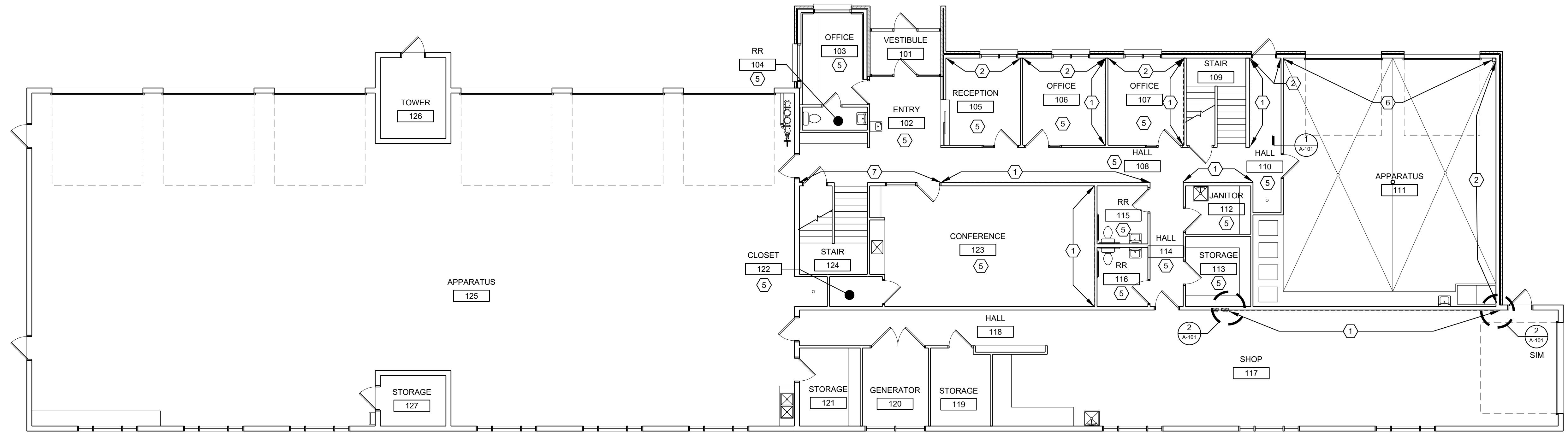
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ROOF FRAMING DETAILS

sheet: S8.11

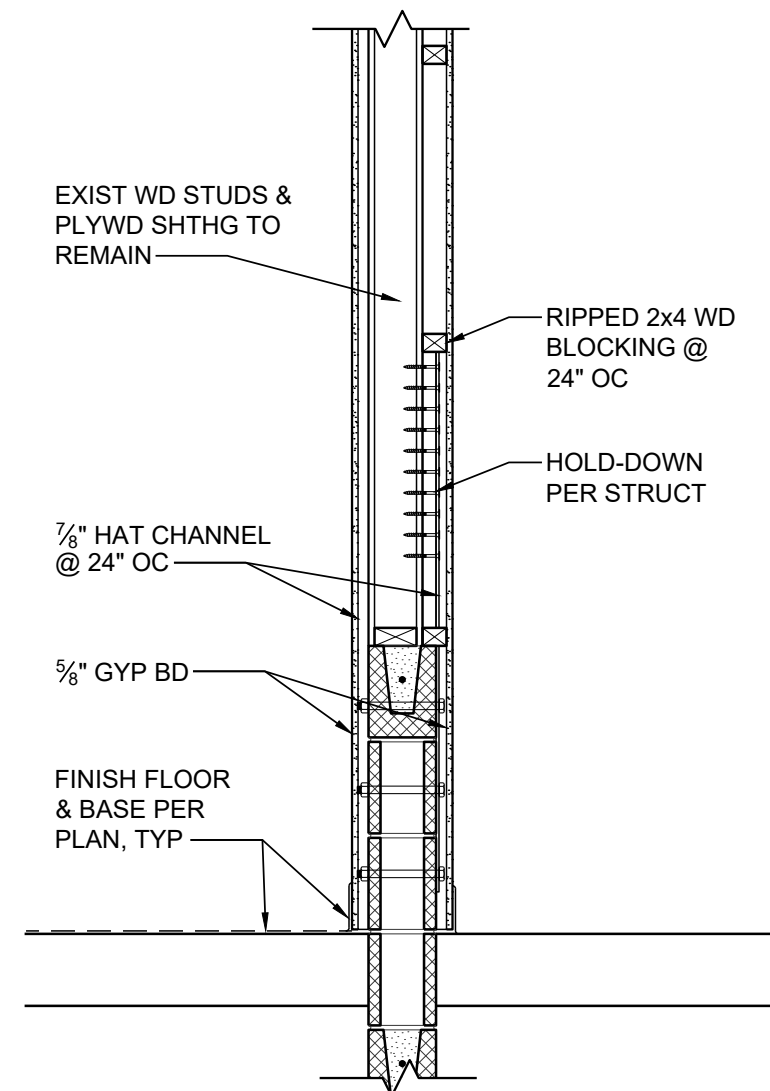
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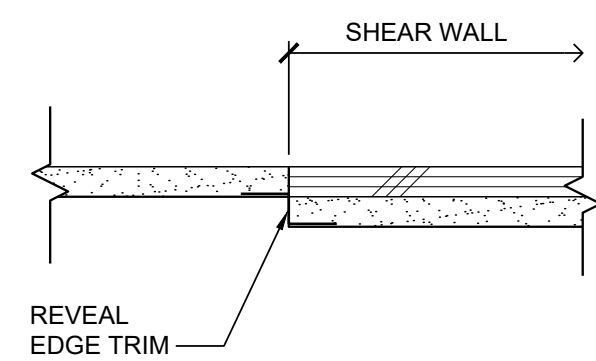
FIRST FLOOR PLAN
1/8" = 1'-0"

CONSTRUCTION NOTES

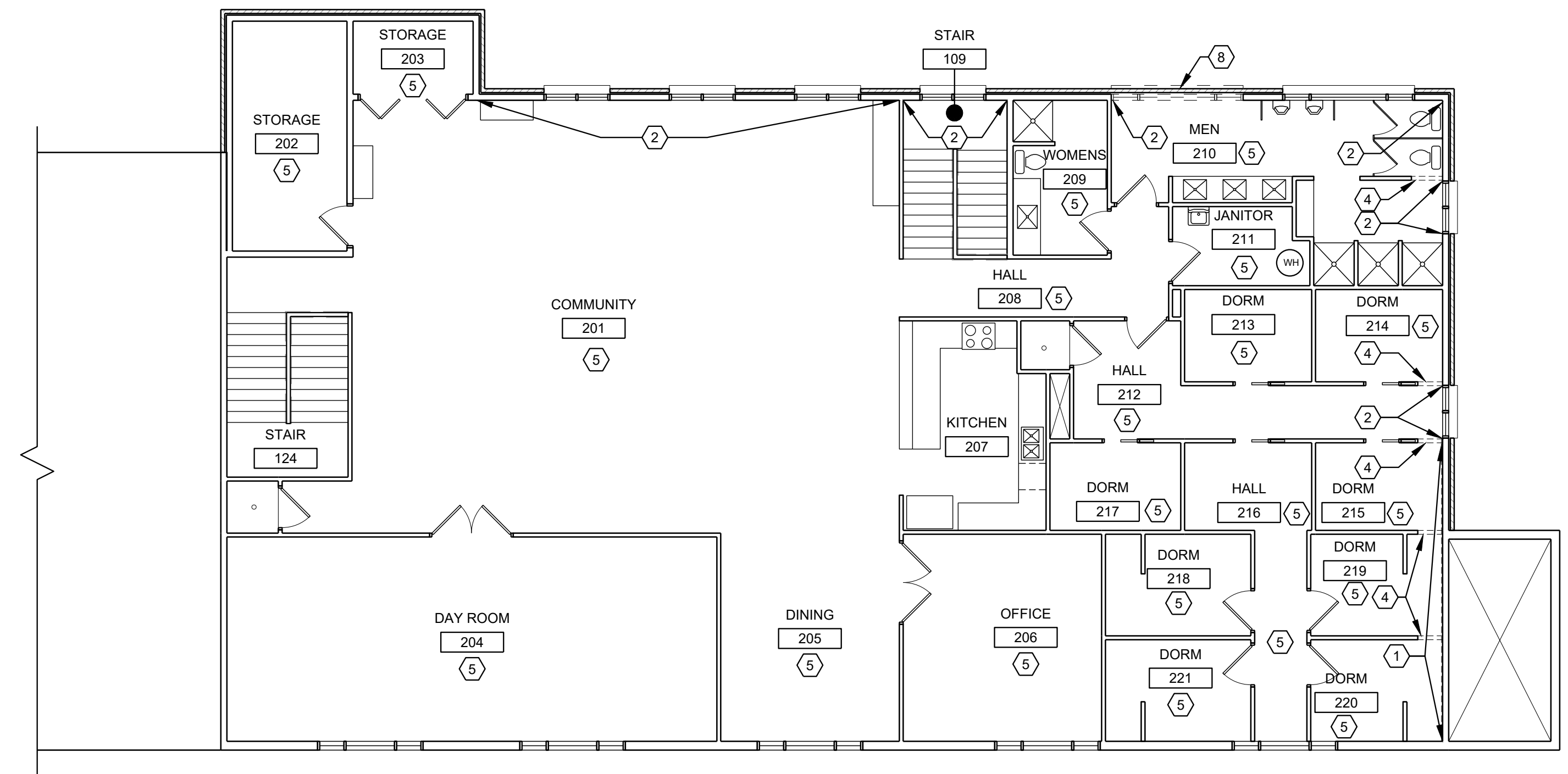
- 1 REMOVE EXIST GYP BD TO CONSTRUCT PLYWD SHEAR WALL. INSTALL NEW 5/8" GYP BD & FINISH TO MATCH EXIST. PAINT & INSTALL NEW WALL BASE
- 2 REMOVE BOTTOM 4'-0" OF GYP BD TO INSTALL HOLD-DOWNS PER STRUCT. REPLACE GYP BD & TEXTURE TO MATCH EXIST. PAINT & INSTALL NEW WALL BASE, ENTIRE WALL
- 3 REMOVE EXIST WINDOW & SILL. INFILL OPENING W/ WOOD STUD FRAMING, PLYWD SHTHG, WRB, & TOOTH-IN BRICK TO MATCH EXISTING CONSTRUCTION. INSTALL VAPOR BARRIER & GYP BD INTERIOR, TEXTURE TO MATCH EXISTING
- 4 REMOVE EXIST WALL FRAMING TO COMPLETE STRUCTURAL WORK. RE-FRAME, FINISH, & TEXTURE TO MATCH EXIST CONSTRUCTION
- 5 REMOVE & REPLACE FLOORING & WALL BASE W/ SHEET VINYL FLOORING & RUBBER BASE. 6" BASE IN RESTROOMS, 4" ELSEWHERE
- 6 REMOVE BOTTOM 4'-0" OF GYP BD TO INSTALL HOLD-DOWNS PER STRUCT. REPLACE GYP BD, OVERLAY ENTIRE WALL W/ 5/8" GYP BD & TEXTURE TO MATCH EXIST. PAINT & INSTALL NEW WALL BASE, ENTIRE WALL
- 7 ADD LAYER OF GYP BD TO FLUSH WALL WITH ADJACENT FINISH. TEXTURE & PAINT TO MATCH



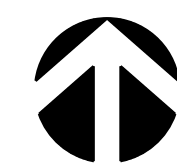
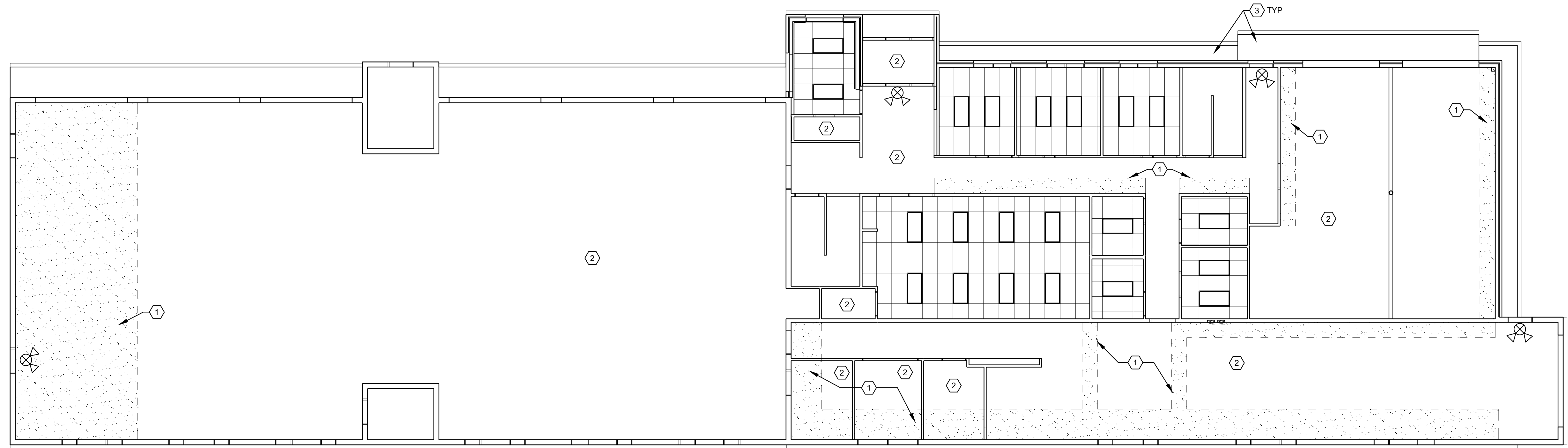
1 WALL SECTION
3/4" = 1'-0"



2 SHEAR WALL TERMINATION
3" = 1'-0"



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



FIRST FLOOR REFLECTED CEILING PLAN

1/8" = 1'-0"

GENERAL NOTES

1. REMOVE & REPLACE ALL EXIST SUSPENDED AC CEILINGS, INCL LIGHT FIXTURES
2. CENTER GRIDS IN ROOMS, UON

CONSTRUCTION NOTES

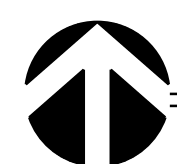
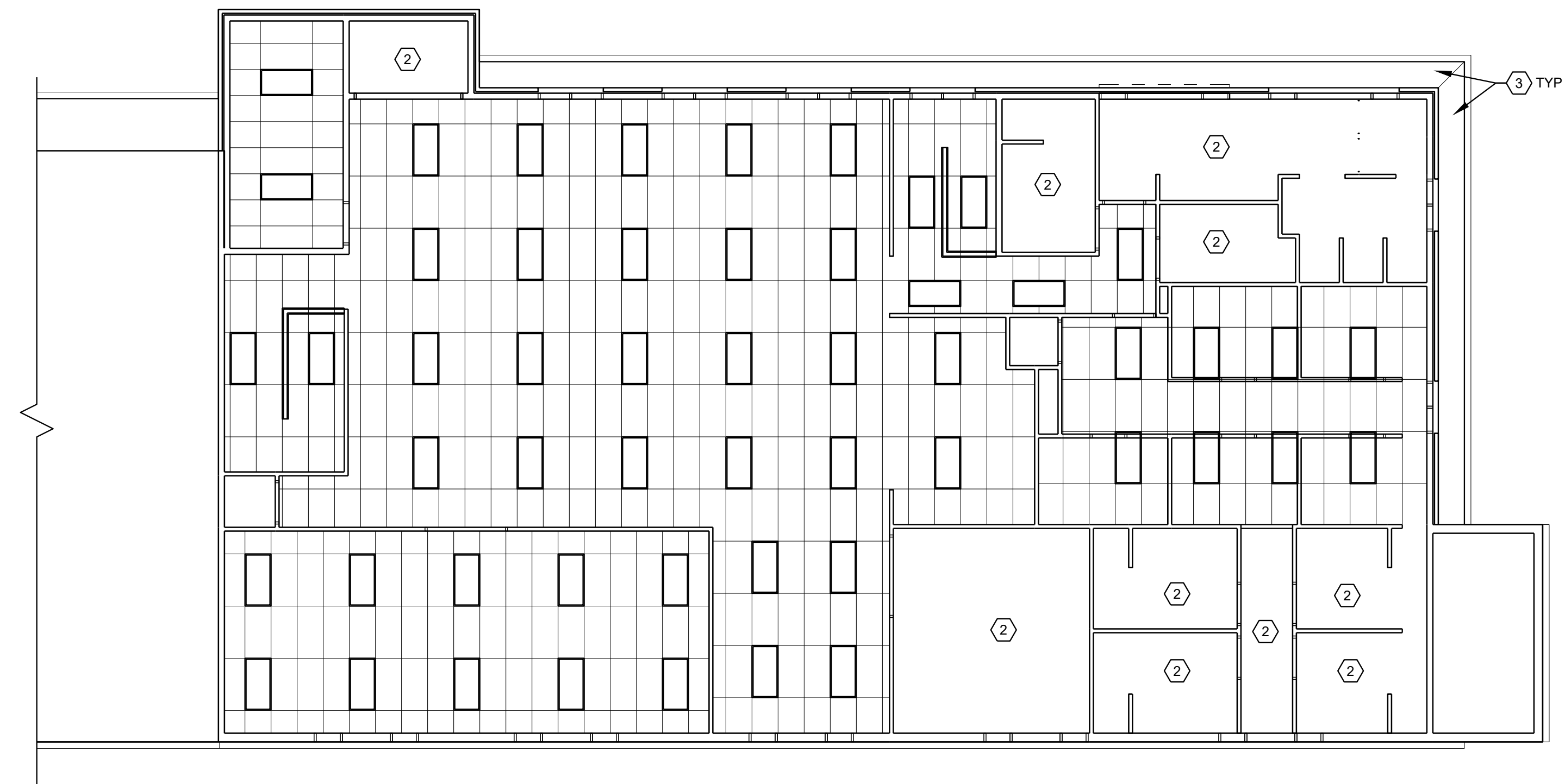
- ① REMOVE EXIST GYP BD CLG TO COMPLETE STRUCTURAL WORK. INSTALL NEW GYP BD & FINISH TO MATCH, PAINT ENTIRE CEILING
- ② EXIST GYP BD CLG & LIGHTING TO REMAIN
- ③ EXIST SOFFIT TO REMAIN

LEGEND

2x4' SUSP AC CLG, SEE DTLS 1-3 / S7.11

2x4' LED LIGHT FIXTURE

REPLACE EXIST EXIST SIGN. NEW LED EXIT SIGN W/ BATTERY BACK-UP



SECOND FLOOR REFLECTED CEILING PLAN

1/8" = 1'-0"

revisions:



date: 06-03-2021

project: 00419

dwg file: A-102-00419

drawn by: NW

checked by:

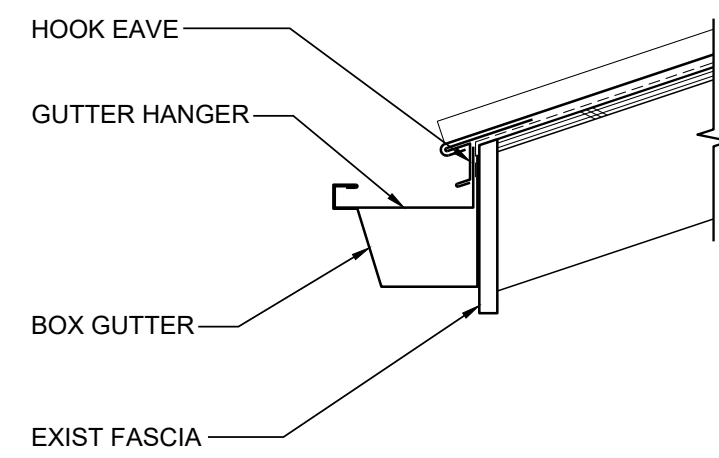
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REFLECTED
CEILING PLANS

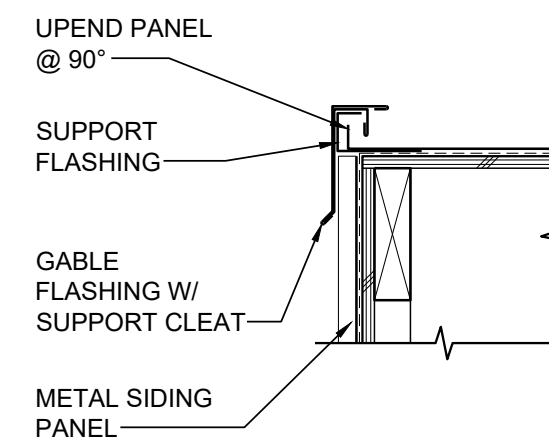
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A-102

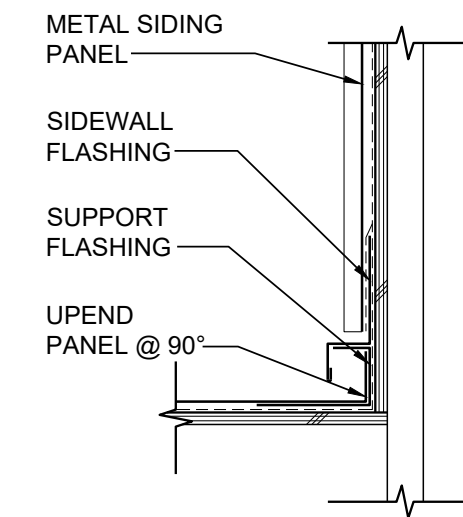
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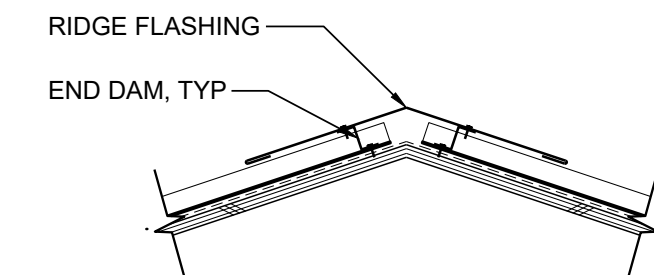
1 GUTTER DETAIL
1-1/2" = 1'-0"



2 RAKE DETAIL
1-1/2" = 1'-0"



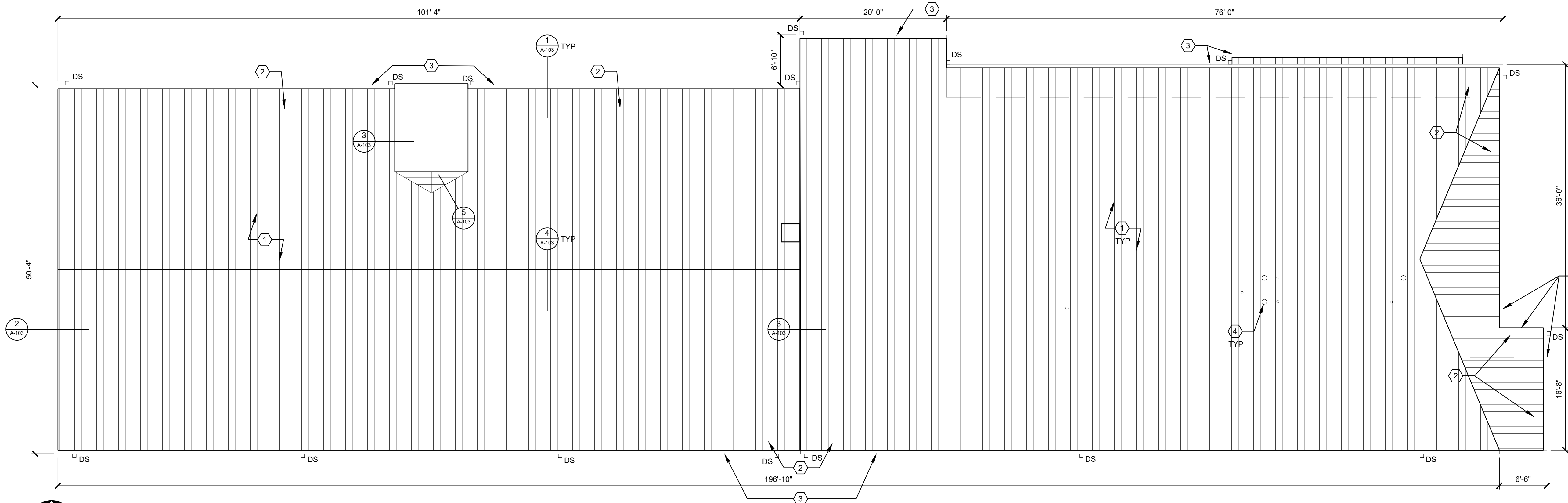
3 SIDEWALL FLASHING
1-1/2" = 1'-0"



4 RIDGE FLASHING
1-1/2" = 1'-0"

CONSTRUCTION NOTES

- ① REMOVE EXIST METAL ROOF INSTALL 22-GA STANDING SEAM METAL ROOF.
- ② REMOVE EXIST ROOF SHTHG TO COMPLETE STRUCTURAL WORK. REPLACE W/ NEW PLYWD ROOF SHTHG.
- ③ REMOVE & REPLACE EXIST GUTTERS AND DOWNSPOUTS
- ④ EXISTING ROOF PENETRATION. INSTALL FLASHING & SEALANT PER MANUFACTURER'S STANDARD DETAIL

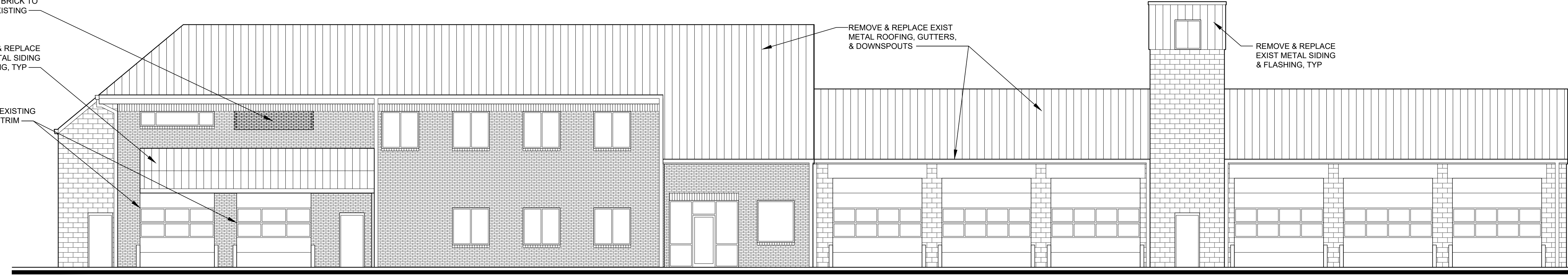


ROOF PLAN
1/8" = 1'-0"

REMOVE EXIST WINDOW & SILL, TOOTH-IN BRICK TO MATCH EXISTING

REMOVE & REPLACE EXIST METAL SIDING & FLASHING, TYP

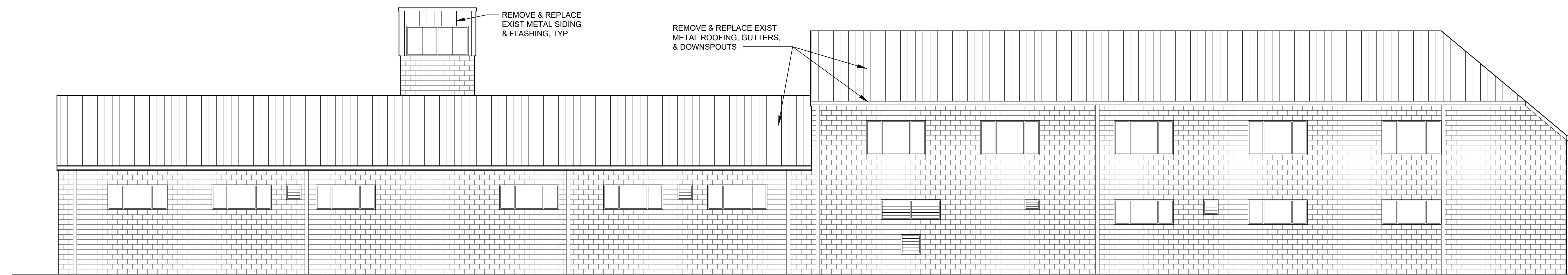
REPLACE EXISTING OH DOOR TRIM



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

REMOVE & REPLACE EXIST METAL SIDING & FLASHING, TYP

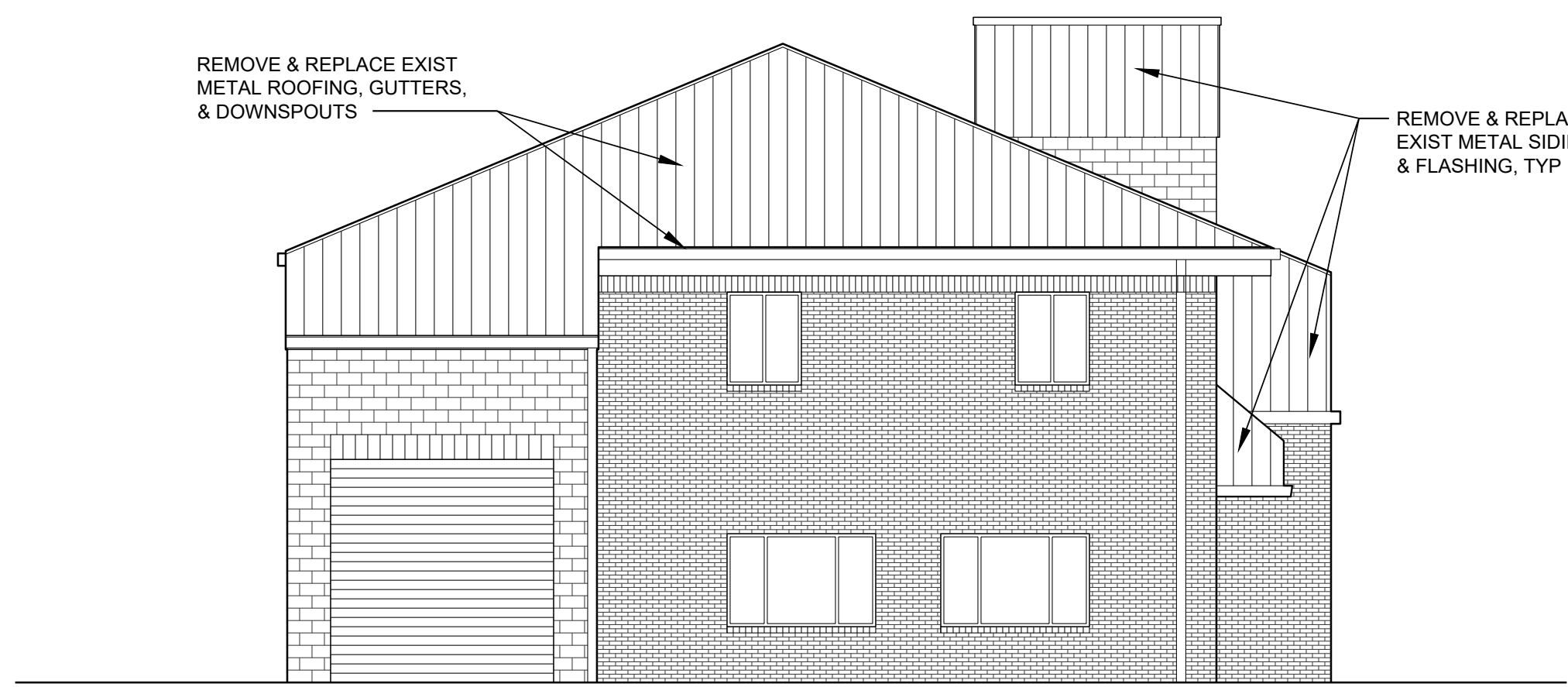
REMOVE & REPLACE EXIST METAL ROOFING, GUTTERS, & DOWNSPOUTS



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

REMOVE & REPLACE EXIST METAL ROOFING, GUTTERS, & DOWNSPOUTS

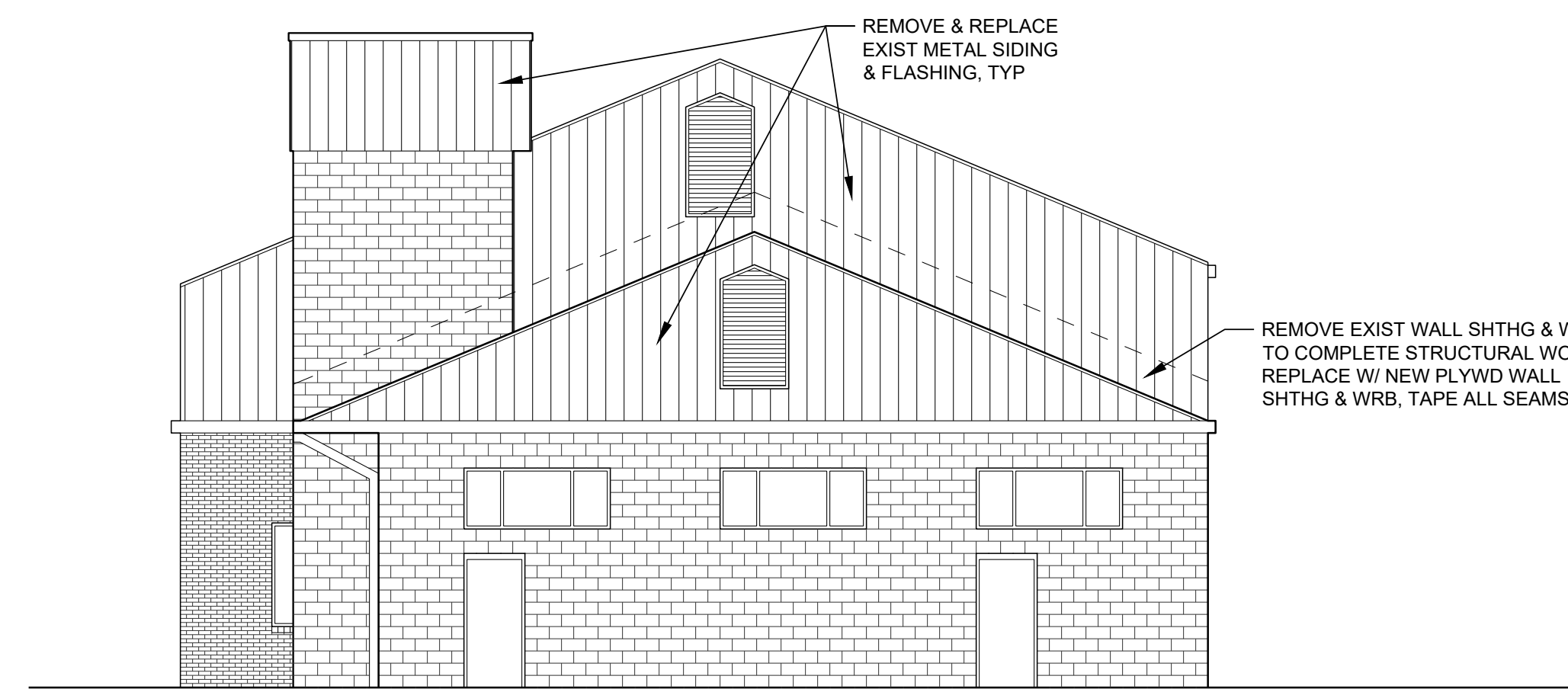
REMOVE & REPLACE EXIST METAL SIDING & FLASHING, TYP



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

REMOVE & REPLACE EXIST METAL SIDING & FLASHING, TYP

REMOVE EXIST WALL SHTHG & WRB TO COMPLETE STRUCTURAL WORK. REPLACE W/ NEW PLYWD WALL SHTHG & WRB, TAPE ALL SEAMS



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

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REGISTERED ARCHITECT
NICHOLAS L. WALLACE
SALEM, OREGON
STATE OF OREGON

project: SHERIDAN FIRE STATION SEISMIC UPGRADE
230 SW MILL STREET
SHERIDAN, OR 97378
consultants:

revisions:
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▲
▲
▲

date: 06-03-2021
project: 00419
dwg file: A-201-00419
drawn by: NW
checked by:
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EXTERIOR ELEVATIONS

sheet: **A-201**
of:

SHERIDAN FIRE STATION

SEISMIC UPGRADE

HVAC

WORK SCOPE

THESE DRAWINGS AND THE SPECIFICATIONS, FOR THE SHERIDAN FIRE STATION SEISMIC RETROFIT, SUMMARIZE THE WORK. THE REQUIREMENTS OF BOTH DRAWINGS AND SPECIFICATIONS MUST BE MET UNDER THIS CONTRACT. THE WORK IS LISTED BY SPECIFICATION DIVISION AND IS SUMMARIZED BELOW. REFER TO BOTH PLANS AND SPECIFICATIONS FOR A COMPLETE DESCRIPTION OF THE WORK. IN THE CASE OF ANY DISCREPANCY, THE MORE STRINGENT REQUIREMENT SHALL APPLY. BRING ANY DISCREPANCIES TO THE ENGINEER'S ATTENTION FOR RESOLUTION.

THE WORK UNDER THIS CONTRACT IS TO PROVIDE THE LABOR, MATERIAL, AND EQUIPMENT TO REPLACE EXISTING T-BAR GRID LAY IN DIFFUSERS AND GRILLES. ALL EXISTING LAY-IN CEILING DIFFUSERS, LAY-IN GRILLES, AND ASSOCIATED GRILL OR DIFFUSER CANS AND FLEX DUCT, SHALL BE DEMOED. EXISTING DIFFUSERS AND GRILLES IN HARD LID CEILINGS ARE TO REMAIN UNLESS DEMO IS REQUIRED FOR SEISMIC REMODEL WORK AS CALLED OUT ON THE PLANS. AS PART OF THE SEISMIC RETROFIT WORK, ALL EXISTING T-BAR CEILINGS WILL BE DEMOED INCLUDING CEILING DIFFUSERS AND GRILLES. DIFFUSERS AND GRILLE REPLACEMENT IS ONE-FOR-ONE. BRING ANY DISCREPANCY BETWEEN DESIGN DOCUMENTS AND EXISTING CONDITIONS TO THE ENGINEER'S ATTENTION FOR RESOLUTION.

REMOVE, PROTECT, AND RE-INSTALL. CEILING EXHAUST FANS EF-10 AND EF-11. PROTECT EXHAUST FAN EF-3. REMOVE AND REINSTALL EXHAUST FAN EF-3 IF REQUIRED BY SEISMIC OR CEILING REPLACEMENT WORK.

REMOVE AND PROTECT MAINTENANCE BAY RADIANT HEAT TUBE, REFLECTOR, BURNERS, AND HARDWARE. REMOVE GAS LINE SERVING MAINTENANCE BAY RADIANT HEATER AS REQUIRED FOR SEISMIC WORK. PROTECT THE MAINTENANCE BAY RADIANT HEAT EXHAUST FAN IN PLACE. RE-INSTALL GAS LINE, RADIANT HEAT TUBE, RADIANT HEAT REFLECTOR, RADIANT HEAT BURNERS, AND CONNECT TO RADIANT HEAT EXHAUST FAN. RE-CONNECT CONTROL THERMOSTAT AND CONFIRM RADIANT HEAT AND THERMOSTAT FUNCTION.

PROVIDE CODE REQUIRED SEISMIC SUPPORTS, ANCHORS, AND BRACING AS REQUIRED FOR CODE COMPLIANCE BUILDING WIDE. SEISMICALLY ANCHOR EXISTING CONDENSING UNITS CU-1, 2, 3, AND 4. PROVIDE AND INSTALL SEISMIC SUPPORTS FOR FURNACES F-1, 2, 3, AND 4. PROVIDE SEISMIC SUPPORTS FOR THE DOMESTIC HOT WATER HEATER. SEISMICALLY RESTRAIN RADIANT HEATERS IN THE MAINTENANCE BAY AND THE EQUIPMENT BAYS. SEISMICALLY ANCHOR COMPRESSORS AND COMPRESSOR EQUIPMENT CALLED OUT ON PLANS. SEISMICALLY SUPPORT AND RESTRAIN VARIOUS EXHAUST FANS AND ONE SUPPLY FAN. SEISMICALLY SUPPORT AND ANCHOR COMMERCIAL WASHER AND ICE MAKER. SUPPORT GAS LINES AFTER LAST ELBOW AND BEFORE FLEXIBLE LINE TO APPLIANCE.

DEMO AND REPLACE HARD DUCTING AS CALLED OUT ON THE PLANS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING DEMO WORK TO PRESERVE THE EXISTING HARD DUCTING WHERE DEMO IS NOT REQUIRED. THE CONTRACTOR MAY PRESERVE AND REUSE EXISTING HARD DUCT OR REMOVE AND REPLACE EXISTING HARD DUCTING, IN PART OR IN WHOLE, AT THE CONTRACTOR'S EXPENSE.

EXISTING DUCTING AND EQUIPMENT SHALL BE PROTECTED FROM CONSTRUCTION DUST, DIRT, AND DEBRIS. DUCTING AND EQUIPMENT THAT WILL BE REUSED SHALL BE CLEANED PRIOR TO CONNECTING NEW DUCTING, DIFFUSERS, OR GRILLES.

CONTRACTOR SHALL MAINTAIN EXISTING HVAC CONTROLS INCLUDING THERMOSTATS, SWITCHES, AND TIMERS. COIL BACK CONTROL WIRE OUT OF CONSTRUCTION AREA AND LABEL. PROTECT AND RE-INSTALL AS REQUIRED TO RESTORE FULL FUNCTION.

NO PLUMBING SCOPE IS EXPLICITLY CALLED OUT. HOWEVER, MOVING OR REMOVING AND REPLACING PLUMBING TO ACCOMMODATE SEISMIC CONSTRUCTION IS WORK OF THIS PROJECT. RETURN ANY DISTURBED PIPING TO PRE-WORK FUNCTIONAL STATE USING THE SAME MATERIALS AS EXISTING PIPING. INSULATE AS REQUIRED BY CODE. ANY EXPOSED PIPE LARGER THAN 2 1/2" SHALL BE SEISMICALLY ANCHORED.

WORK COVERED BY CONTRACT DOCUMENTS

DIVISION 22 - PLUMBING

PLUMBING SHALL BE REMOVED AND REPLACED IF REQUIRED BY SEISMIC WORK. ANY EXPOSED PIPE LARGER THAN 2 1/2" SHALL BE SEISMICALLY ANCHORED.

DIVISION 23 - HEATING, VENTILATION, & AIR CONDITIONING (HVAC)

23 01 00 - BASIC MECHANICAL MATERIALS & METHODS

COORDINATE THE VARIOUS TRADES; APPLY AND PAY FOR PERMITS; SUPPLY SUBMITTALS, AS-BUILT DOCUMENTATION; AND COORDINATE SAFETY.

23 01 30 - HVAC AIR DUCT CLEANING

CLEAN EXISTING DUCTING

23 05 00 - COMMON WORK RESULTS FOR HEATING, VENTILATION, AND AIR CONDITIONING

DEMOLITION, SEALING AND FIRE CAULKING, DUCT PENETRATION, CUTTING AND PATCHING.

23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

VIBRATION AND SEISMIC MOUNTING OF DUCTING, PIPING (IF REQUIRED), AND EQUIPMENT.

23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PROVIDE TEST AND BALANCE FOR AIR AND HYDRONIC SYSTEMS.

23 07 00 - HVAC INSULATION

PROVIDE DUCTING INSULATION.

23 08 00 - COMMISSIONING OF HVAC

CONFIRM EQUIPMENT OPERATION.

23 11 00 - FUEL GAS PIPING SYSTEM AND TESTING

REPLACE, RECONNECT, AND TEST NATURAL GAS PIPING.

23 31 00 - HVAC DUCTS AND CASINGS

DUCT, CAN, PLENUM ETC. CONSTRUCTION REQUIREMENTS.

23 33 00 - AIR DUCT ACCESSORIES

DAMPERS, TURNING VANES, ETC.

23 37 13 - DIFFUSERS, REGISTERS & GRILLES

PROVIDE REPLACEMENT DIFFUSERS AND GRILLES

23 41 00 - PARTICULATE AIR FILTRATION

PROVIDE FILTER MEDIA FOR ALL SUPPLY AIR SYSTEMS.

GENERAL CONSTRUCTION NOTES

GENERAL PROVISIONS

THE WORK UNDER THIS CONTRACT IS TO PROVIDE THE LABOR, MATERIAL, AND EQUIPMENT FOR THE CEILING DEMO AND REPLACEMENT, AS DESCRIBED IN THIS DOCUMENT. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION, STARTUP, AND OPERATIONAL CHECKOUT FOR A FULLY FUNCTIONAL SYSTEM. THE CONTRACTOR SHALL ALSO PROVIDE TAB AND COMMISSIONING SUPPORT TO FULLY BALANCE AND COMMISSION ALL HVAC EQUIPMENT.

THE DRAWINGS AND WORK SCOPE ARE NOT INTENDED TO BE COMPREHENSIVE OF ALL WORK TO BE DONE UNDER THIS CONTRACT. SPECIFICATION, DRAWINGS, AND WORK SCOPE MUST BE USED IN THEIR ENTIRETY TO DEVELOP A FULL UNDERSTANDING OF THE WORK TO BE DONE UNDER THIS CONTRACT.

CONTRACTOR SHALL PROVIDE AND INSTALL ALL COMPONENTS REQUIRED FOR COMPLETE MECHANICAL SYSTEMS INCLUDING BUT NOT LIMITED TO MISCELLANEOUS FITTINGS, BRACKETS, SUPPORTS, MECHANICAL PARTS, ETC. THE COMPLETE SYSTEM SHALL MEET ALL REQUIREMENTS IN THE CONSTRUCTION DOCUMENTS, LOCAL AND STATE CODES, AND MANUFACTURERS' INSTALLATION REQUIREMENTS AND RECOMMENDATIONS. BRING ANY CONFLICTING REQUIREMENTS TO THE ENGINEER'S ATTENTION FOR RESOLUTION BEFORE PURCHASING OR INSTALLING EQUIPMENT OR SYSTEMS.

CONTRACTOR WORK SHALL INCLUDE, BUT IS NOT LIMITED TO, THE FOLLOWING MECHANICAL SYSTEMS:

- PROVIDE AND INSTALL NEW CEILING DIFFUSERS AND GRILLES AS INDICATED IN THE DRAWINGS
- PROVIDE NEW DUCTING, WHERE INDICATED OR REQUIRED
- CLEAN ALL EXISTING DUCTING AND EQUIPMENT TO BE REUSED
- ADD DUCT MOUNTED VOLUME DAMPERS, IF REQUIRED, FOR SYSTEM BALANCE. OBD DAMPERS WILL BE APPROVED ON A CASE-BY-CASE BASIS ONLY IF NECESSARY.
- ADD EQUIPMENT SEISMIC BRACING, ANCHORS, AND SUPPORTS WHERE INDICATED ON DRAWINGS AND WHERE REQUIRED BY CODE.

ALL WORK SHALL COMPLY WITH APPLICABLE CODES AND REGULATIONS AS ENFORCED BY THE STATE OF OREGON AND THE LOCAL CODE AUTHORITY.

INSTALL ALL WORK PARALLEL AND PLUMB TO BUILDING LINES.

ALL DUCTWORK, PIPING, AND EQUIPMENT SHALL BE INSTALLED IN A MANNER AND IN LOCATIONS TO AVOID OBSTRUCTION, PRESERVE HEADROOM, AND KEEP OPENINGS AND PASSAGEWAYS CLEAR.

ALL EXPOSED HVAC DIFFUSERS, GRILLES, DUCTING, AND MISCELLANEOUS COMPONENTS SHALL BE PAINTED WHITE TO MATCH WALLS AND CEILING. COORDINATE COLOR CHOICE WITH ARCHITECT. IN AREAS WHERE CEILING OR WALLS ARE NOT WHITE, COORDINATE COLOR CHOICE WITH ARCHITECT. THE INTERIOR OF ANY DUCT THAT IS VISIBLE FROM AN OCCUPIED SPACE SHALL BE PAINTED FLAT BLACK.

TO ENSURE THE STRUCTURAL INTEGRITY OF THE BUILDING, ALL CUTTING REQUIRED FOR THE INSTALLATION OF DUCTS, PIPING, AND CONDUIT IS TO BE CLEARED THROUGH THE ENGINEER PRIOR TO START OF WORK.

ELECTRICAL SHALL PROVIDE CONVENIENCE OUTLET WITHIN 25 FEET OF ALL HVAC EQUIPMENT FOR MAINTENANCE SERVICE. CONTRACTOR SHALL CONFIRM ELECTRIC OUTLET LOCATIONS AND COORDINATE WITH ELECTRICAL CONTRACTOR.

MAINTAIN AS-BUILT DRAWINGS THAT DOCUMENT ALL CHANGES TO THE EXISTING SYSTEMS AND PROVIDE AS-BUILT DRAWINGS TO THE OWNER AT PROJECT COMPLETION.

DUCTWORK

PROVIDE ESSENTIALLY AIR TIGHT SHEET METAL DUCTWORK. DUCTWORK SHALL CONFORM TO ASHRAE, LATEST EDITION, AND CONSTRUCTED PER SMACNA MANUAL OF HVAC DUCT CONSTRUCTION STANDARDS AND IN ACCORDANCE WITH THE OREGON MECHANICAL CODE, LATEST EDITION.

ALL FIELD DUCTING JOINTS AND SEAMS SHALL BE ESSENTIALLY AIR TIGHT. ALL DUCT SHALL BE CONSTRUCTED TO A PRESSURE CLASS OF 1" W.C. ADJUSTABLE DUCT FITTINGS ARE NOT ALLOWED. ALL FIELD JOINTS MUST HAVE ENGINEERED MECHANICAL FASTENERS OR SHALL BE SECURED WITH A MINIMUM OF 3 EQUALLY SPACED RIVETS OR SCREWS. FIELD JOINTS MUST BE GASKETED OR SEALED WITH MASTIC. DUCT SEALING MUST BE CODE AND ASHRAE 90.1 COMPLIANT.

DUCT SIZES LISTED ARE NET INSIDE DIMENSIONS. ALLOW FOR SHEET METAL AND INSULATION THICKNESS.

ALL DUCTWORK CROSSING OR TERMINATING AT A FIRE RATED BARRIER SHALL BE CONSTRUCTED OF STAINLESS OR GALVANIZED SHEET STEEL WITH A MINIMUM METAL THICKNESS OF 26 GAGE AND RUN CONTINUOUSLY FROM THE AIRHANDLER OR EQUIPMENT TO THE AIR OUTLET AND INLET TERMINALS.

REFER TO SPECIFICATION FOR DUCTWORK QUALITY REQUIREMENTS.

DUCTWORK SHALL COMPLY WITH OREGON STRUCTURAL SPECIALTY CODE 1317.7.

SHEET METAL TO COMPLY WITH ASTM-525, WITH 1-1/4 OZ COATING AND BEAR STAMP OF MANUFACTURER.

DUCT ACCESSORIES

TURNING VANES ARE REQUIRED WHETHER SHOWN OR NOT FOR ALL DUCT ELBOW ANGLES GREATER THAN 45 DEGREES. DOUBLE THICKNESS AIRFOIL TYPE TURNING VANES ARE REQUIRED WHERE LENGTH OF TURNING VANE EXCEEDS 16", AIR VELOCITY EXCEEDS 1,000 FPM, OR DUCT PRESSURE CLASS EXCEEDS 2" W.C.

VOLUME DAMPERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA AND ASHRAE 90.1 REQUIREMENTS AND GUIDELINES.

DUCT CONNECTORS SHALL BE IMC, SMACNA, OR APPROVED MANUFACTURED JOINING SYSTEM. DUCT CONNECTORS SHALL BE ASHRAE 90.1 COMPLIANT.

FLEXIBLE DUCT CONNECTORS SHALL BE IMPREGNATED DUROPRENE GLASS FABRIC, LOW SMOKE DEVELOPMENT. PROVIDE WITH THE NECESSARY ANGLE, STRAPS, BOLTS, OR CLIPS TO SECURE THE MATERIAL TO THE EQUIPMENT AND DUCT.

BALANCE DAMPERS

PROVIDE BALANCE DAMPERS FOR EACH SUPPLY AND RETURN OUTLET.

BALANCING DAMPERS TO BE QUADRANT DAMPER INSTALLED IN DUCTWORK WITH LOCKING LEVER.

OBD GRILL DAMPERS NOT ALLOWED UNLESS CALLED OUT OR APPROVED BY ENGINEER.

WHERE BALANCING DAMPERS ARE NOT DIRECTLY ACCESSIBLE FOR ADJUSTMENT, FROM EITHER OCCUPIED SPACE OR DESIGNATED MECHANICAL ROOMS, PROVIDE REMOTE OPERATORS TO CEILING BOX IN OCCUPIED SPACE SERVED OR TO AN EASILY ACCESSIBLE SPACE IN A DESIGNATED MECHANICAL ROOM. LABEL DAMPER OPERATOR AS SUPPLY, RETURN, OR EXHAUST, AND INCLUDE ROOM SERVED.

UNLESS CALLED OUT OTHERWISE, CEILING RETURN AIR GRILLES SHALL BE PERFORATED PLATE STYLE.

MECHANICAL CONTROLS

THE DESIGN INTENT IS TO USE EXISTING MECHANICAL EQUIPMENT AND CONTROLS. BRING ANY EQUIPMENT OR CONTROL FAILURES TO THE OWNER'S, ARCHITECTS, AND ENGINEER'S ATTENTION FOR RESOLUTION.

FIRE SPRINKLER SYSTEM

FOR ALL CEILING AREAS, ADD AND MOVE SPRINKLER HEADS AS REQUIRED FOR A CODE COMPLIANT FIRE SPRINKLER SYSTEM.

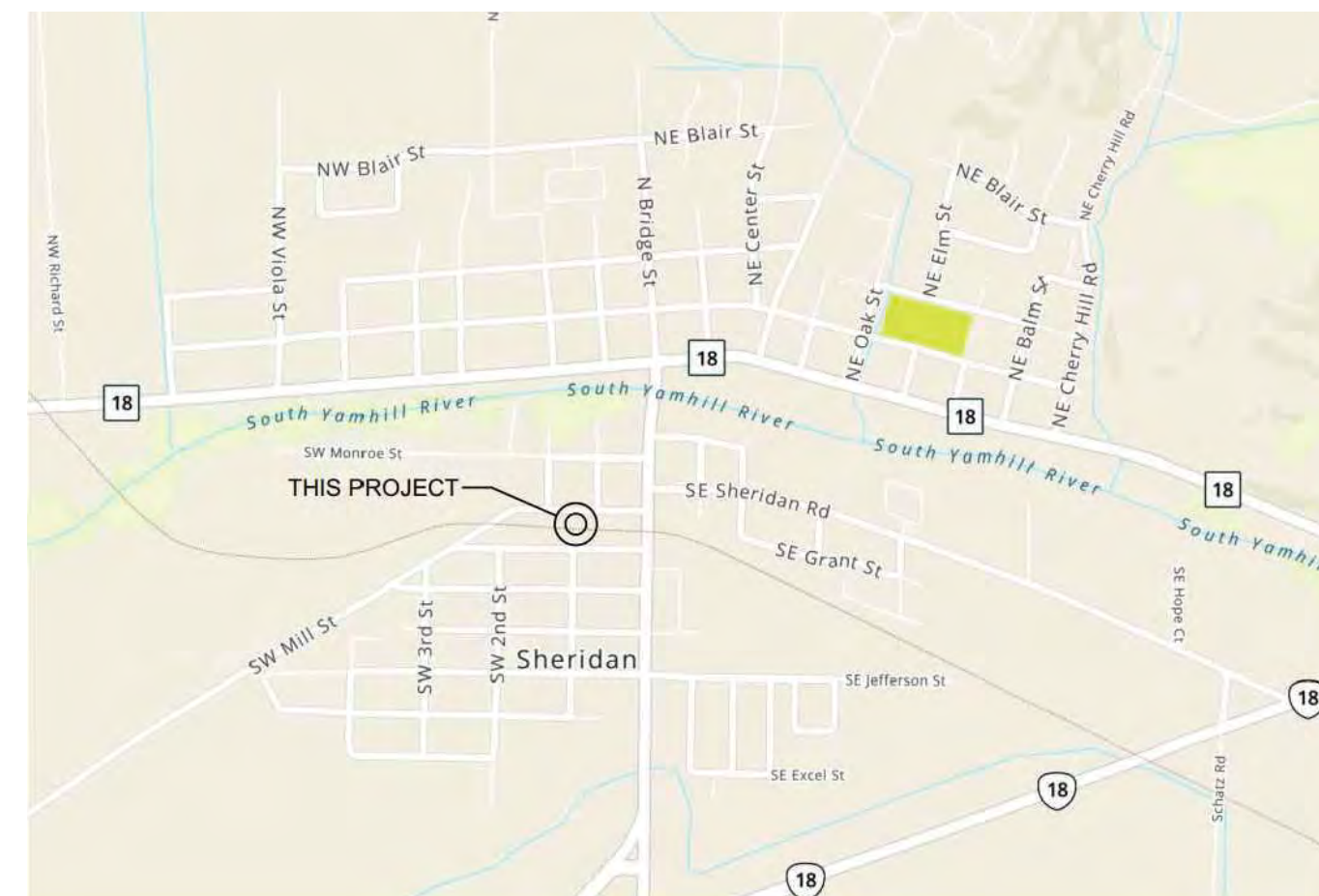
THE SHERIDAN FIRE STATION BUILDING IS FULLY SPRINKLERED. HOWEVER, SOME COVERAGE AREAS MAY NOT BE CODE COMPLIANT. IN ADDITION TO COVERAGE CONCERNS, SOME PIPING SUPPORT AND REQUIREMENTS FOR FLEXIBLE COUPLINGS MAY NOT MEET CURRENT CODE. THE CONTRACTOR IS RESPONSIBLE FOR SURVEYING THE EXISTING FIRE SPRINKLER SYSTEM AND DETERMINING CODE DEFICIENCIES. THE FINAL INSTALLED FIRE SPRINKLER SYSTEM SHALL MEET ALL CODE REQUIREMENTS.

WORK OF THIS PROJECT WILL ADD SEISMIC SHEAR WALLS, ADD SEISMIC REINFORCEMENT, REMODEL FLOOR PLANS, AND REPLACE SOME CEILINGS. REMOVAL AND REPLACEMENT OF FIRE SPRINKLER PIPE AND SPRINKLER HEADS MAY BE REQUIRED TO ACCOMMODATE SEISMIC, ARCHITECTURAL, AND MECHANICAL REMODEL WORK. SOME FIRE SPRINKLER PIPE AND HEADS MAY BE RELOCATED TO ACCOMMODATE CEILING REMODEL WORK OR SEISMIC WORK. ADDITIONAL FIRE SPRINKLER PIPE AND HEADS MAY BE REQUIRED TO MAINTAIN CODE COMPLIANCE. CONTRACTOR IS RESPONSIBLE FOR FIRE SPRINKLER DESIGN AND FIRE SPRINKLER WORK FOR ALL AREAS BUILDING WIDE, WHETHER SPECIFICALLY IDENTIFIED OR NOT.

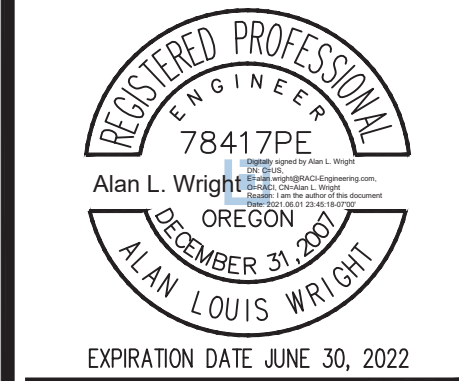
IF AND WHERE REQUIRED BY CODE, PROVIDE AND INSTALL SEISMIC SUPPORTS FOR FIRE SPRINKLER PIPE AND EQUIPMENT. IF AND WHERE REQUIRED BY CODE, INSTALL SEISMIC JOINTS IN ANY FIRE SPRINKLER PIPE WHERE REQUIRED DUE TO SEISMIC BUILDING MOVEMENT. THE FINAL FIRE SPRINKLER DESIGN SHALL BE CODE COMPLIANT AND MEET ALL REQUIREMENTS OF NFPA-13.

COORDINATE FIRE SPRINKLER WORK WITH OTHER TRADES. FINAL PRODUCT SHALL MAINTAIN CODE COMPLIANCE FOR FULL FIRE SPRINKLER COVERAGE. COORDINATE WITH LOCAL AUTHORITY HAVING JURISDICTION. MAINTAIN AS-BUILT DRAWINGS THAT DOCUMENT ALL CHANGES TO THE EXISTING FIRE SPRINKLER SYSTEM AND PROVIDE AS-BUILT DRAWINGS TO THE OWNER AT PROJECT COMPLETION.

VICINITY MAP



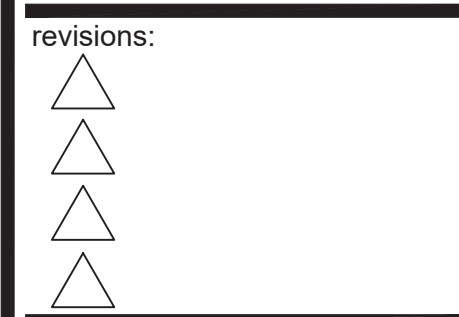
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EXPIRATION DATE JUNE 30, 2022



project: SHERIDAN FIRE STATION SEISMIC UPGRADE
230 SW MILL STREET
SHERIDAN, OR 97378
consultants: RACI ENGINEERING MECHANICAL, CONTROLS, AND PLUMBING DESIGN
raci-engineering.com



date: 06-03-2021
project: 06519
dwg file:
drawn by: YD
checked by: AW
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COVER SHEET

sheet: **M-001**

of:

LEGEND AND ABBREVIATIONS				DUCTWORK SYMBOLS			
SYMBOL OR ABBREVIATION	DEFINITION	SYMBOL OR ABBREVIATION	DEFINITION	SINGLE LINE	DOUBLE LINE	SINGLE LINE	DOUBLE LINE
AFF	ABOVE FINISH FLOOR				DUCT UP		RETURN/EXHAUST DUCT UP
EA	EXHAUST AIR				DUCT DOWN		RETURN/EXHAUST DUCT DOWN
OA	OUTSIDE AIR				SUPPLY DUCT UP		HORIZONTAL OFFSET SUPPLY/RETURN/EXHAUST
RA	RETURN AIR				SUPPLY DUCT DOWN		RISE/DROP SUPPLY/RETURN/EXHAUST
SA	SUPPLY AIR				POINT OF CONNECTION		45°F TAP TAKE-OFF
	POINT OF CONNECTION				STANDARD RADIUS ELBOW (R = W) SUPPLY/RETURN/EXHAUST		RING DUCT
					TURNING VANES		90°F TAP TAKE-OFF
					SPLIT TAKE-OFF W/ BRANCH DAMPERS SUPPLY		BULLHEAD CONVERGE RETURN/EXHAUST
					BULLHEAD SPLIT SUPPLY		SIDEWALL DUCT MTD. REG./GRILLE
					CEILING DUCT MTD. DIFF/GRILLE		SUPPLY SIDEWALL LINEAR DIFFUSER (W/SHEET METAL PLENUM W/1" LINING & BRANCH CONN FOR EVERY 4' OF LENGTH)
					TAKEOFF TO DIFF/GRILLE		SUPPLY CEILING LINEAR DIFFUSER (W/SHEET METAL PLENUM W/1" LINING & BRANCH CONN FOR EVERY 4' OF LENGTH)
					HARD ELBOW		OPEN END DUCT W/ 1/4"x1/4" WMS
					CEILING DUCT MTD. DIFF/GRILLE		FLEXIBLE DUCT
					ACOUSTICALLY LINED DUCT		
					DUCTWORK OR EQUIPMENT TO BE REMOVED		

<p>22x22[R]1455</p>	<p>2x1.5x60[S]1455</p>
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CARLSON VEIT JUNGE ARCHITECTS PC
 ARCHITECTURE • INTERIOR DESIGN
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REGISTERED PROFESSIONAL ENGINEER
 78417PE
 Alan L. Wright
 OREGON
 DECEMBER 31, 2021
 ALAN LOUIS WRIGHT
 EXPIRATION DATE: JUNE 30, 2022

RACI Engineering

project: **SHERIDAN FIRE STATION SEISMIC UPGRADE**
 230 SW MILL STREET
 SHERIDAN, OR 97378
 consultants: **RACI ENGINEERING MECHANICAL, CONTROLS, AND PLUMBING DESIGN**
 raci-engineering.com

revisions:

date: 06-03-2021
 project: 06519
 dwg file:
 drawn by: YD
 checked by: AW
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SYMBOLS, LEGEND, ABBREVIATIONS

sheet: **M-002**
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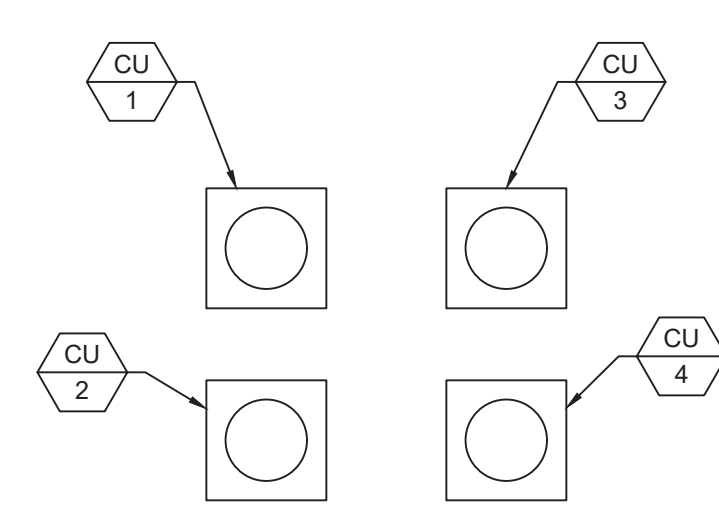
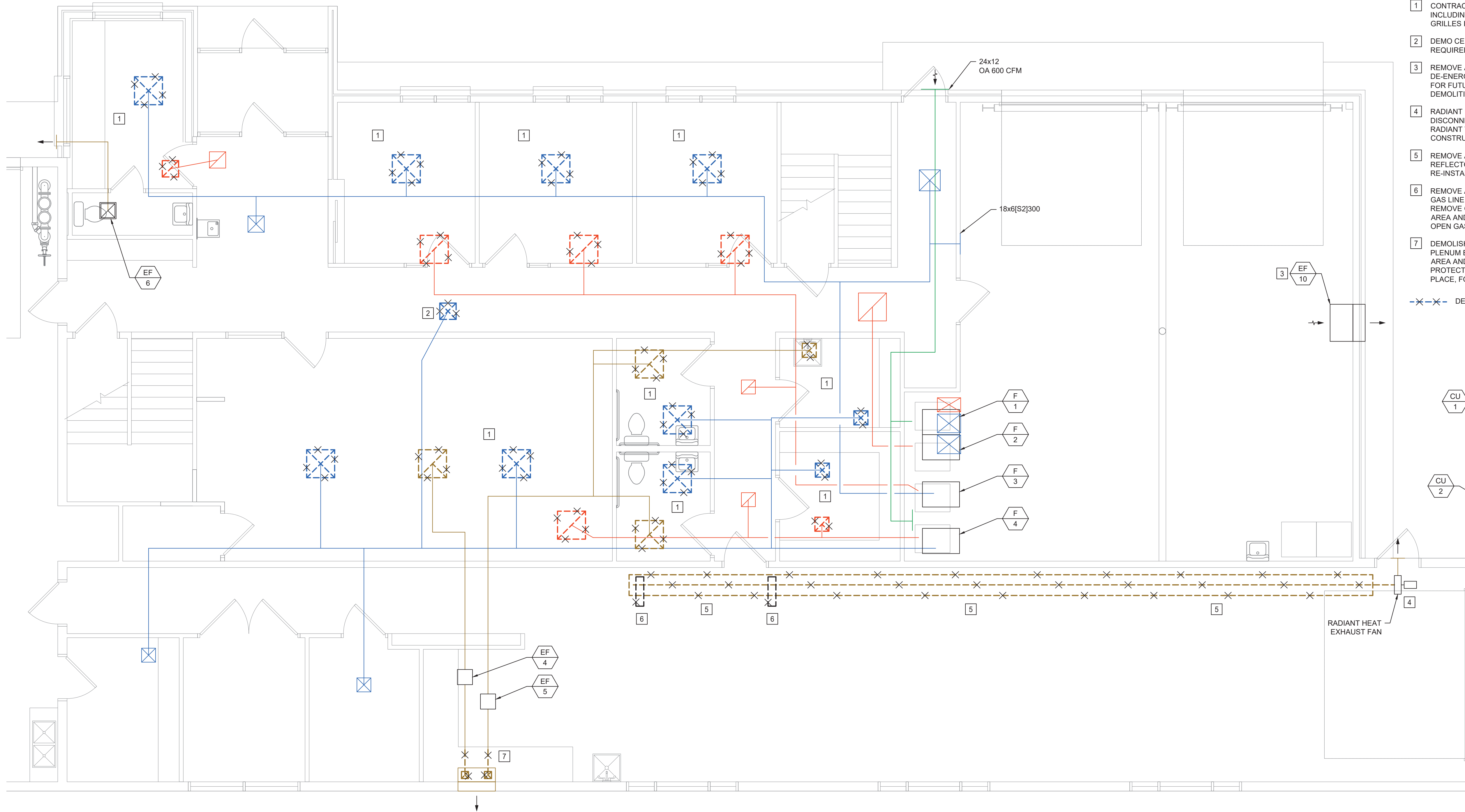
GENERAL NOTES

- FOR THE PURPOSES OF CLEARNESS AND LEGIBILITY, DRAWINGS ARE DIAGRAMMATIC AND FOR DESIGN INTENT ONLY. CONTRACTOR MUST VERIFY ALL DIMENSIONS BY FIELD MEASUREMENT BEFORE BEGINNING ANY FABRICATION OR CONSTRUCTION.
- PROTECT EXISTING DUCTING AND EQUIPMENT FROM DUST, DIRT, AND DAMAGE.

KEYED NOTES

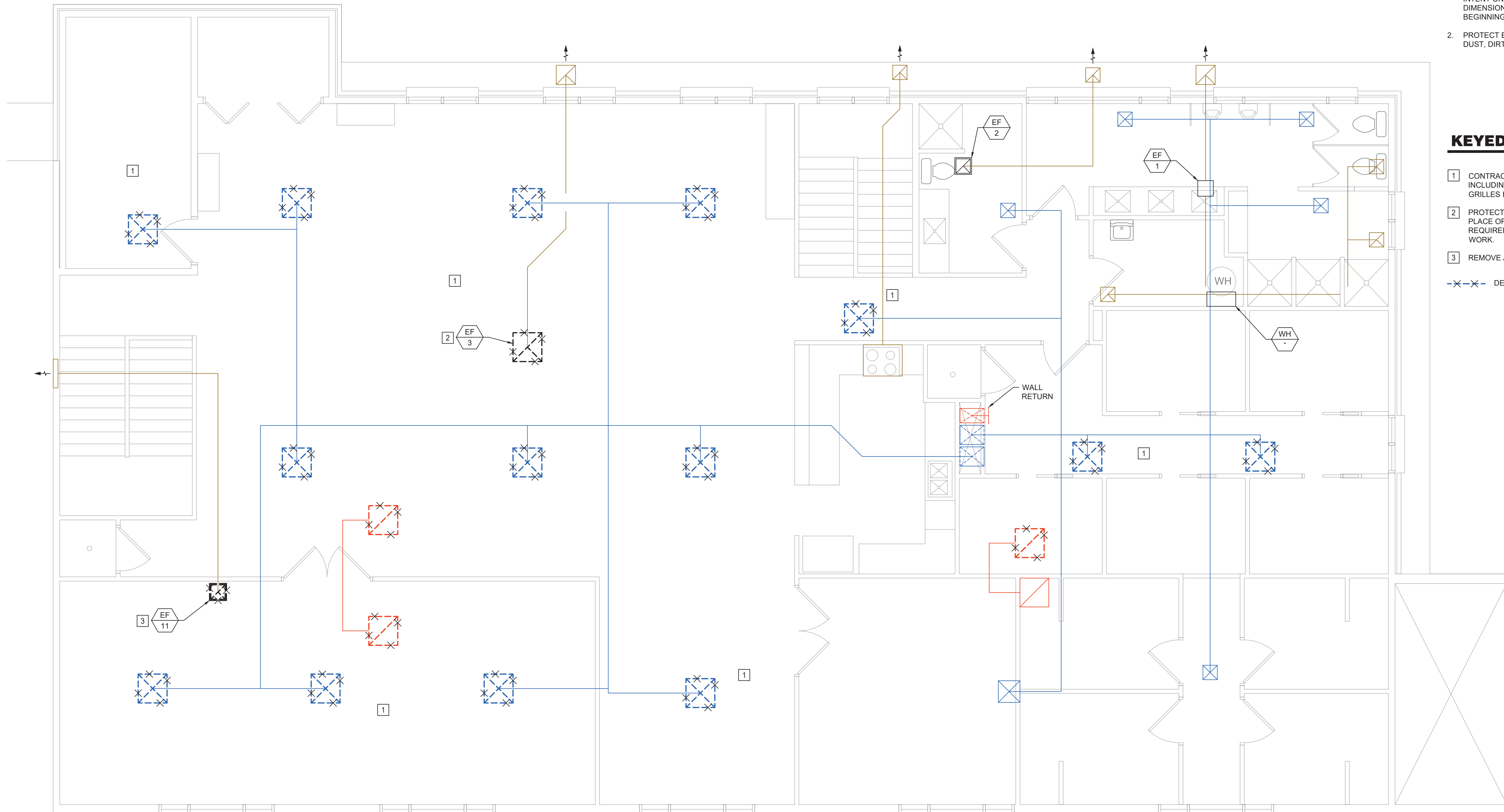
- CONTRACTOR TO DEMOLISH DROP CEILING INCLUDING SUPPLY DIFFUSERS AND RETURN GRILLES IN THIS ROOM.
- DEMO CEILING DIFFUSER OR GRILLE IF REMOVAL IS REQUIRED FOR SEISMIC WALL CONSTRUCTION.
- REMOVE AND PROTECT FOR RE-INSTALLATION. DE-ENERGIZE ELECTRIC CIRCUIT BUT MAINTAIN FOR FUTURE USE. PROTECT WALL LOUVER FROM DEMOLITION AND CONSTRUCTION DAMAGE.
- RADIANT HEAT EXHAUST FAN TO REMAIN. DISCONNECT FLEXIBLE DUCT BETWEEN FAN AND RADIANT TUBE. BAG AND PROTECT FAN FROM CONSTRUCTION DUST AND DAMAGE.
- REMOVE AND PROTECT RADIANT HEAT TUBE, REFLECTOR, AND HARDWARE FOR RE-INSTALLATION.
- REMOVE AND PROTECT BURNER, GAS REGULATOR, GAS LINE AND HARDWARE FOR RE-INSTALLATION. REMOVE GAS LINE BACK PAST RADIANT WORK AREA AND STORE FOR RE-INSTALLATION. CAP ALL OPEN GAS LINES DURING CONSTRUCTION.
- DEMOLISH DUCTING ABOVE CEILING AND DROPS TO PLENUM BOX AS SHOWN IN THE CONSTRUCTION AREA AND AS REQUIRED FOR SEISMIC WORK. PROTECT WALL LOUVER AND PLENUM BOX IN PLACE, FOR FUTURE USE.

-X-X- DENOTES DEMOLITION ITEMS



1 DEMOLITION HVAC FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"





GENERAL NOTES

1. FOR THE PURPOSES OF CLEARNESS AND LEGIBILITY, DRAWINGS ARE DIAGRAMMATIC AND FOR DESIGN INTENT ONLY. CONTRACTOR MUST VERIFY ALL DIMENSIONS BY FIELD MEASUREMENT BEFORE BEGINNING ANY FABRICATION OR CONSTRUCTION.
2. PROTECT EXISTING DUCTING AND EQUIPMENT FROM DUST, DIRT, AND DAMAGE.

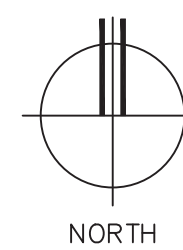
KEYED NOTES

1. CONTRACTOR TO DEMOLISH DROP CEILING INCLUDING SUPPLY DIFFUSERS AND RETURN GRILLES IN THIS ROOM.
2. PROTECT FAN FOR REUSE. FAN SHALL REMAIN IN PLACE OR REMOVE, PROTECT AND RE-INSTALL, IF REQUIRED FOR CEILING REPLACEMENT OR SEISMIC WORK.
3. REMOVE AND PROTECT FOR REINSTALLATION.

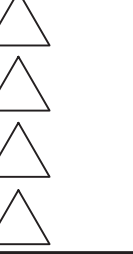
-X-X- DENOTES DEMOLITION ITEMS

1 DEMOLITION HVAC SECOND FLOOR PLAN

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



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DEMOLITION HVAC
SECOND FLOOR PLAN
(RCP)

sheet: **M-102**

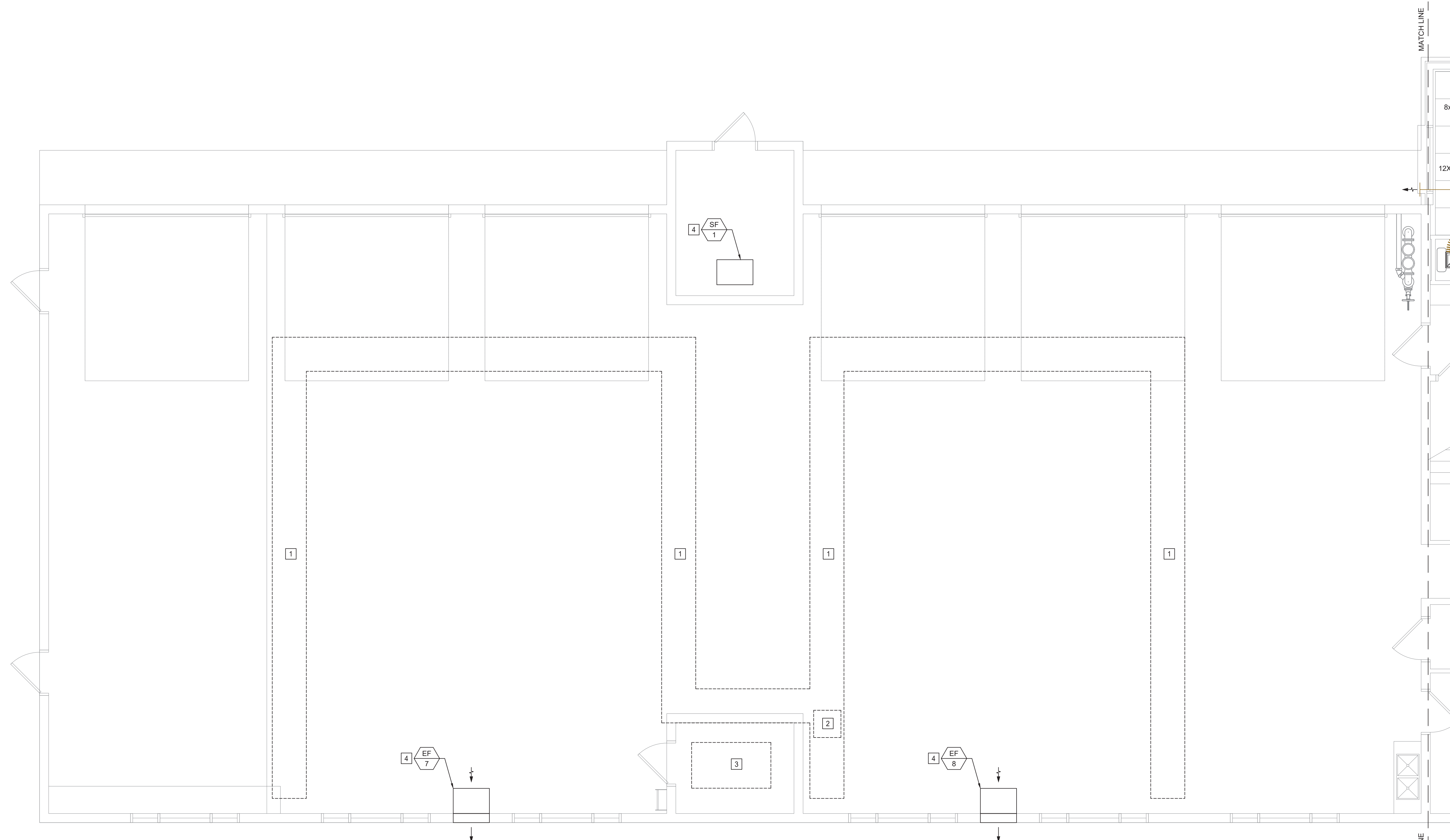
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GENERAL NOTES

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2. CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

KEYED NOTES

1. ADD CODE COMPLIANT SEISMIC BRACING AND SUPPORTS FOR RADIANT HEATER. SUPPORT NATURAL GAS LINE AFTER LAST ELBOW AND BEFORE FLEXIBLE LINE TO APPLIANCE.
2. SEISMICALLY ANCHOR COMPRESSOR.
3. SEISMICALLY ANCHOR COMPRESSOR IN FIRST FLOOR MECHANICAL ROOM AND COMPRESSOR IN MEZZANINE MECHANICAL SPACE.
4. ADD CODE COMPLIANT SEISMIC BRACING AND SUPPORTS.



1 REMODEL HVAC FIRST FLOOR PLAN WEST
 SCALE: 1/4" = 1'-0"
 0 2 4 8 16
 NORTH



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REMODEL HVAC FIRST FLOOR PLAN WEST

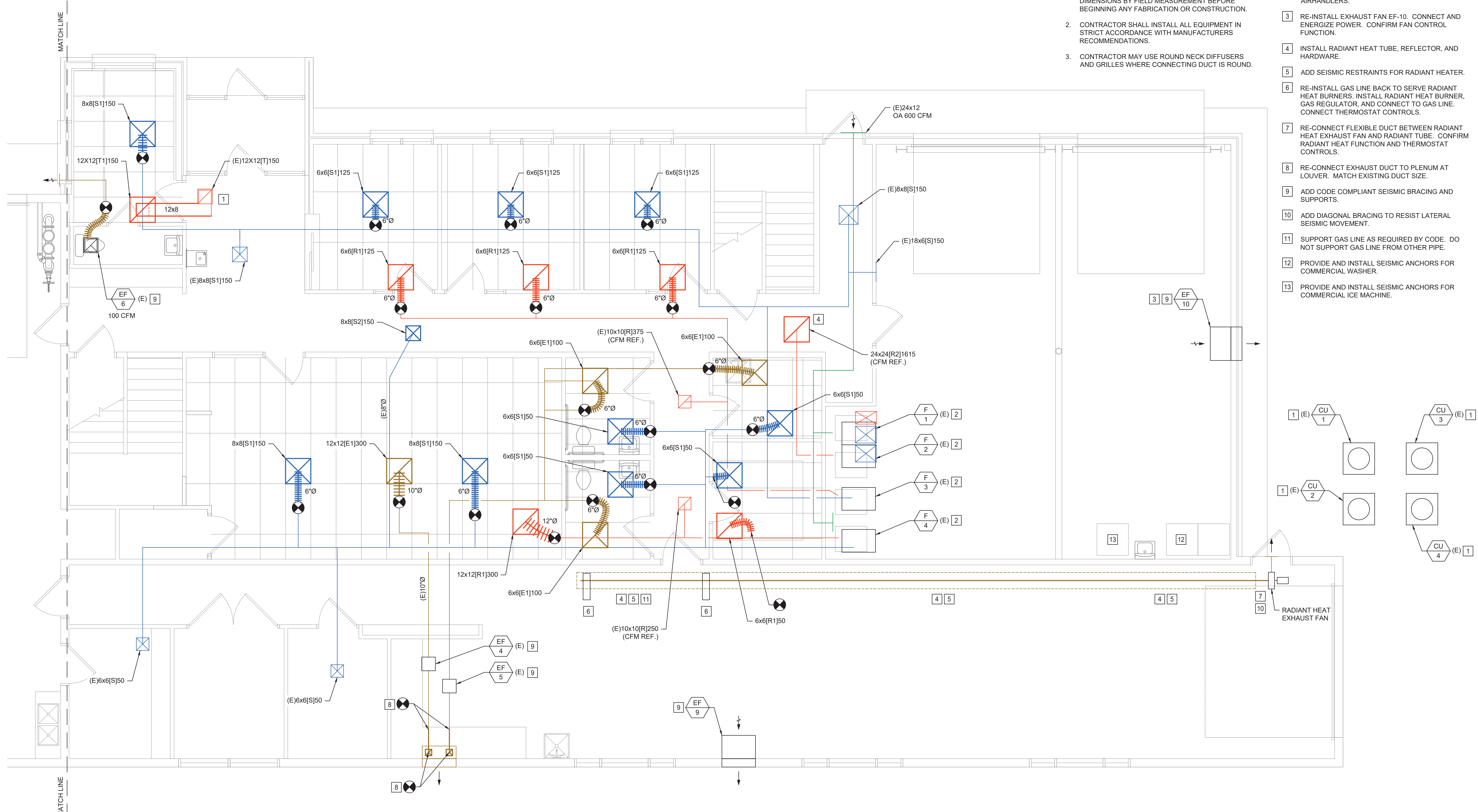
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GENERAL NOTES

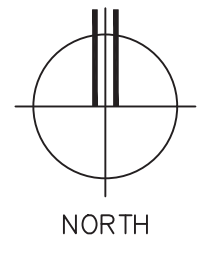
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2. CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
3. CONTRACTOR MAY USE ROUND NECK DIFFUSERS AND GRILLES WHERE CONNECTING DUCT IS ROUND.

KEYED NOTES

- 1 SEISMICALLY ANCHOR EXISTING CONDENSER UNIT.
- 2 SEISMICALLY ANCHOR EXISTING GAS FURNACE AIRHANDLERS.
- 3 RE-INSTALL EXHAUST FAN EF-10. CONNECT AND ENERGIZE POWER. CONFIRM FAN CONTROL FUNCTION.
- 4 INSTALL RADIANT HEAT TUBE, REFLECTOR, AND HARDWARE.
- 5 ADD SEISMIC RESTRAINTS FOR RADIANT HEATER.
- 6 RE-INSTALL GAS LINE BACK TO SERVE RADIANT HEAT BURNERS. INSTALL RADIANT HEAT BURNER, GAS REGULATOR, AND CONNECT TO GAS LINE. CONNECT THERMOSTAT CONTROLS.
- 7 RE-CONNECT FLEXIBLE DUCT BETWEEN RADIANT HEAT EXHAUST FAN AND RADIANT TUBE. CONFIRM RADIANT HEAT FUNCTION AND THERMOSTAT CONTROLS.
- 8 RE-CONNECT EXHAUST DUCT TO PLENUM AT LOUVER. MATCH EXISTING DUCT SIZE.
- 9 ADD CODE COMPLIANT SEISMIC BRACING AND SUPPORTS.
- 10 ADD DIAGONAL BRACING TO RESIST LATERAL SEISMIC MOVEMENT.
- 11 SUPPORT GAS LINE AS REQUIRED BY CODE. DO NOT SUPPORT GAS LINE FROM OTHER PIPE.
- 12 PROVIDE AND INSTALL SEISMIC ANCHORS FOR COMMERCIAL WASHER.
- 13 PROVIDE AND INSTALL SEISMIC ANCHORS FOR COMMERCIAL ICE MACHINE.



1 REMODEL HVAC FIRST FLOOR PLAN EAST
 SCALE: 1/4" = 1'-0"
 0 2 4 8 16



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 EXPIRATION DATE: JUNE 30, 2022

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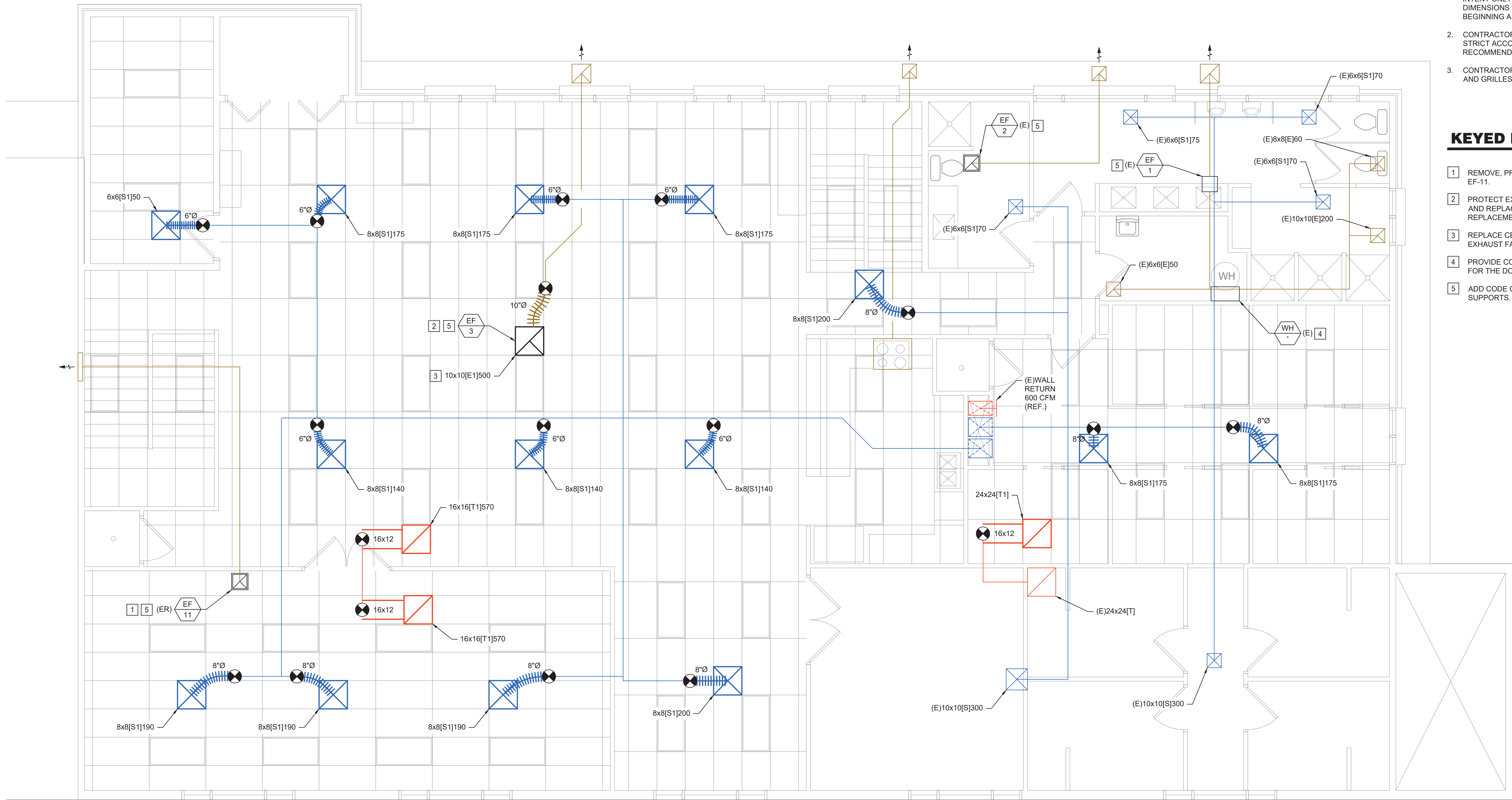
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REMODEL HVAC FIRST FLOOR PLAN EAST (RCP)

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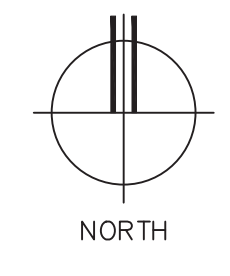
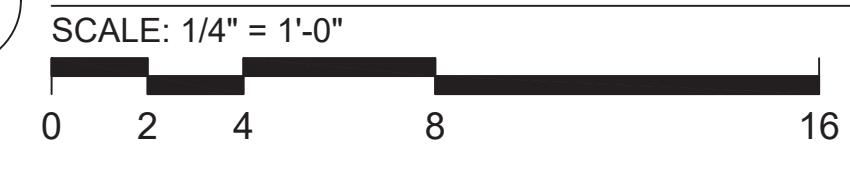
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- CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
- CONTRACTOR MAY USE ROUND NECK DIFFUSERS AND GRILLES WHERE CONNECTING DUCT IS ROUND.

KEYED NOTES

- REMOVE, PROTECT, AND REINSTALL EXHAUST FAN EF-11.
- PROTECT EXHAUST FAN EF-3 IN PLACE. REMOVE AND REPLACE IF NECESSARY FOR CEILING REPLACEMENT OR SEISMIC WORK.
- REPLACE CEILING GRILLE IF NOT INTEGRAL TO EXHAUST FAN.
- PROVIDE CODE COMPLIANT SEISMIC SUPPORTS FOR THE DOMESTIC WATER HEATER.
- ADD CODE COMPLIANT SEISMIC BRACING AND SUPPORTS.

1 REMODEL HVAC SECOND FLOOR PLAN



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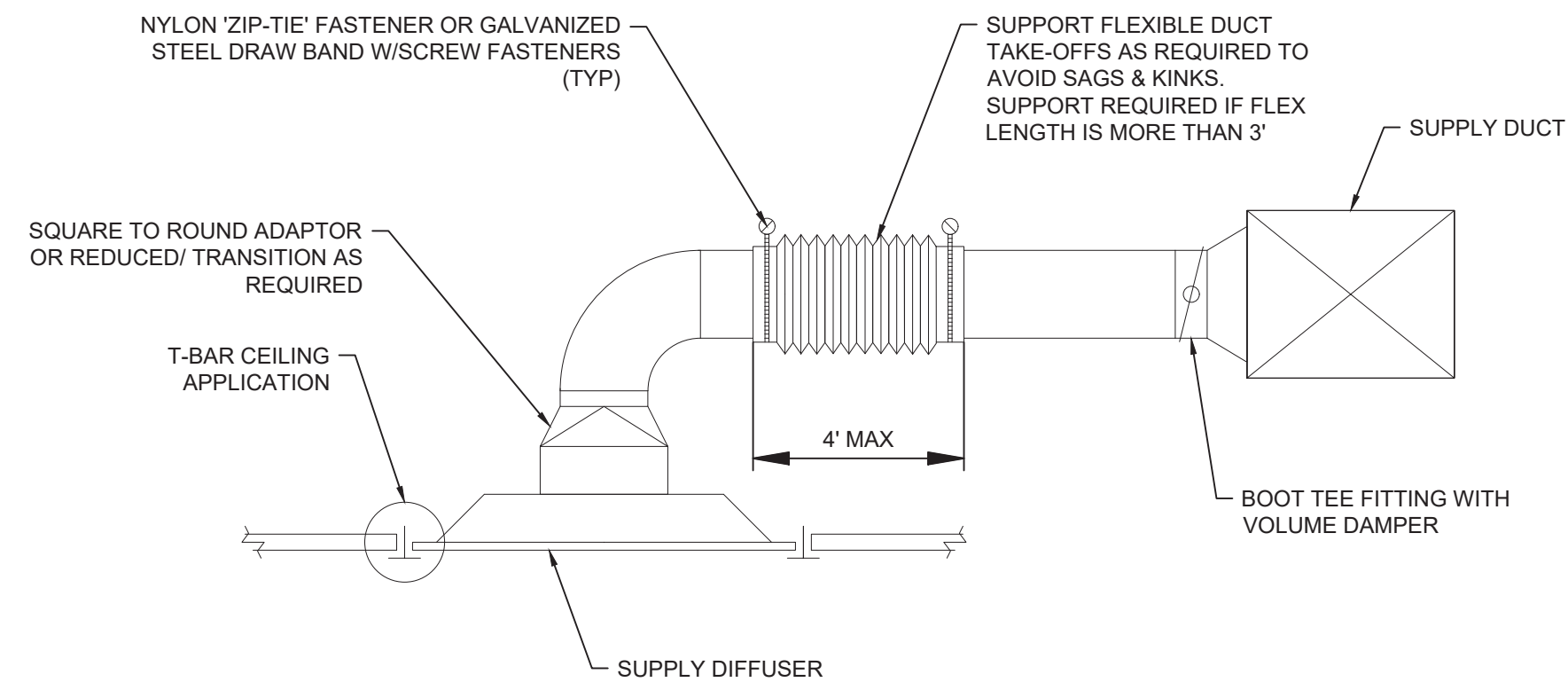
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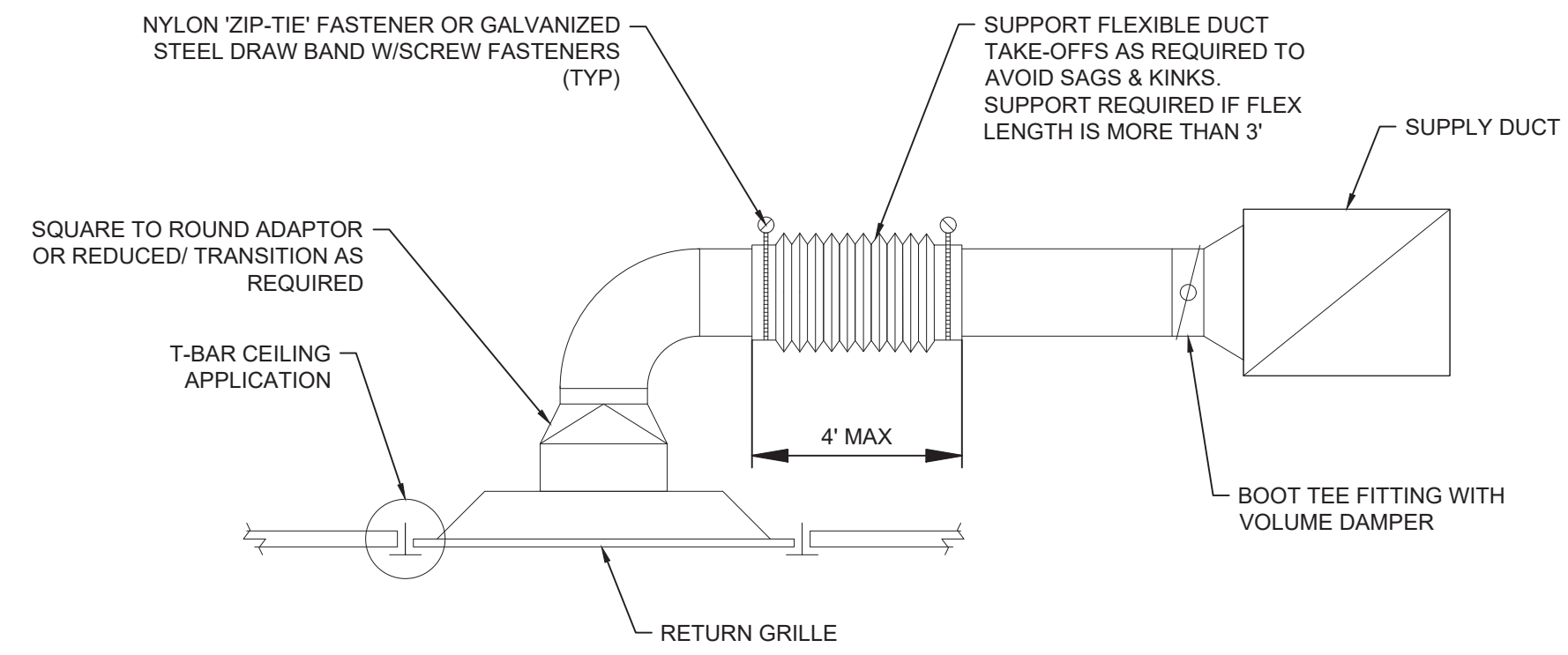
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REMODEL HVAC SECOND FLOOR PLAN (RCP)

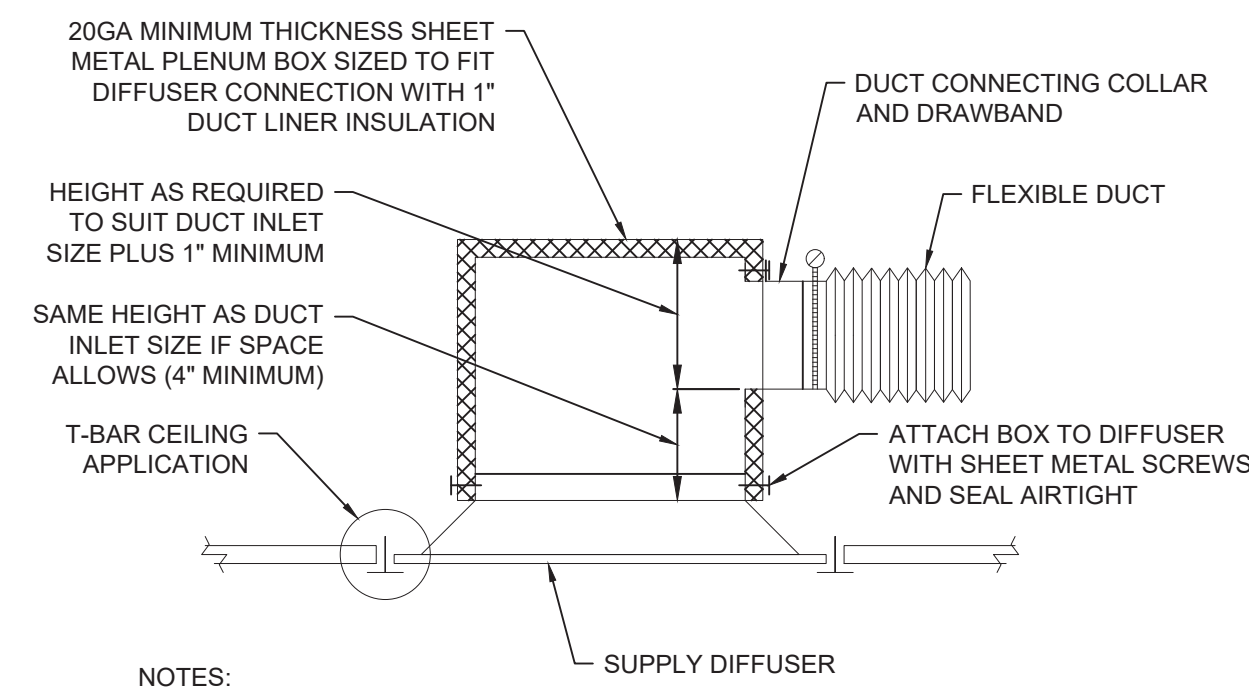
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1 TYPICAL LAY-IN DIFFUSER CONNECTION
SCALE: NOT TO SCALE

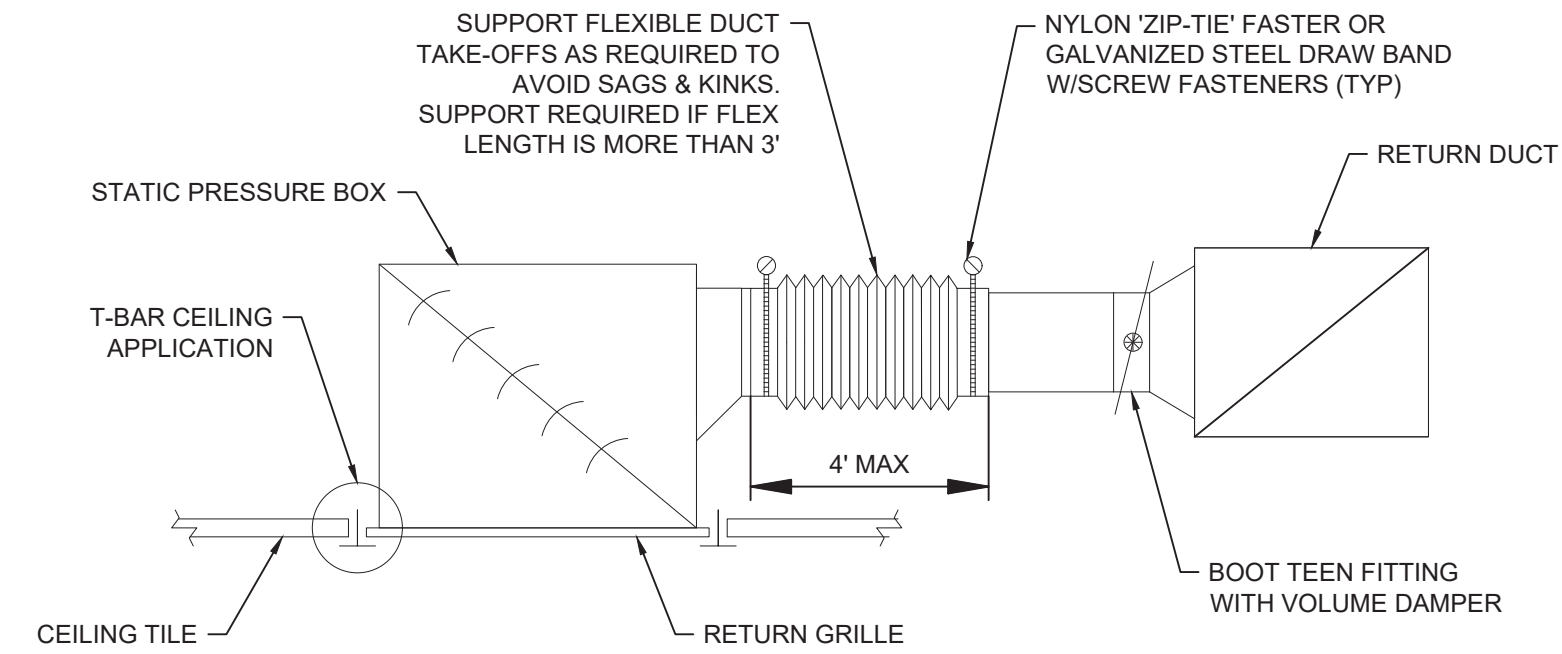


2 TYPICAL LAY-IN RETURN GRILLE CONNECTION
SCALE: NOT TO SCALE

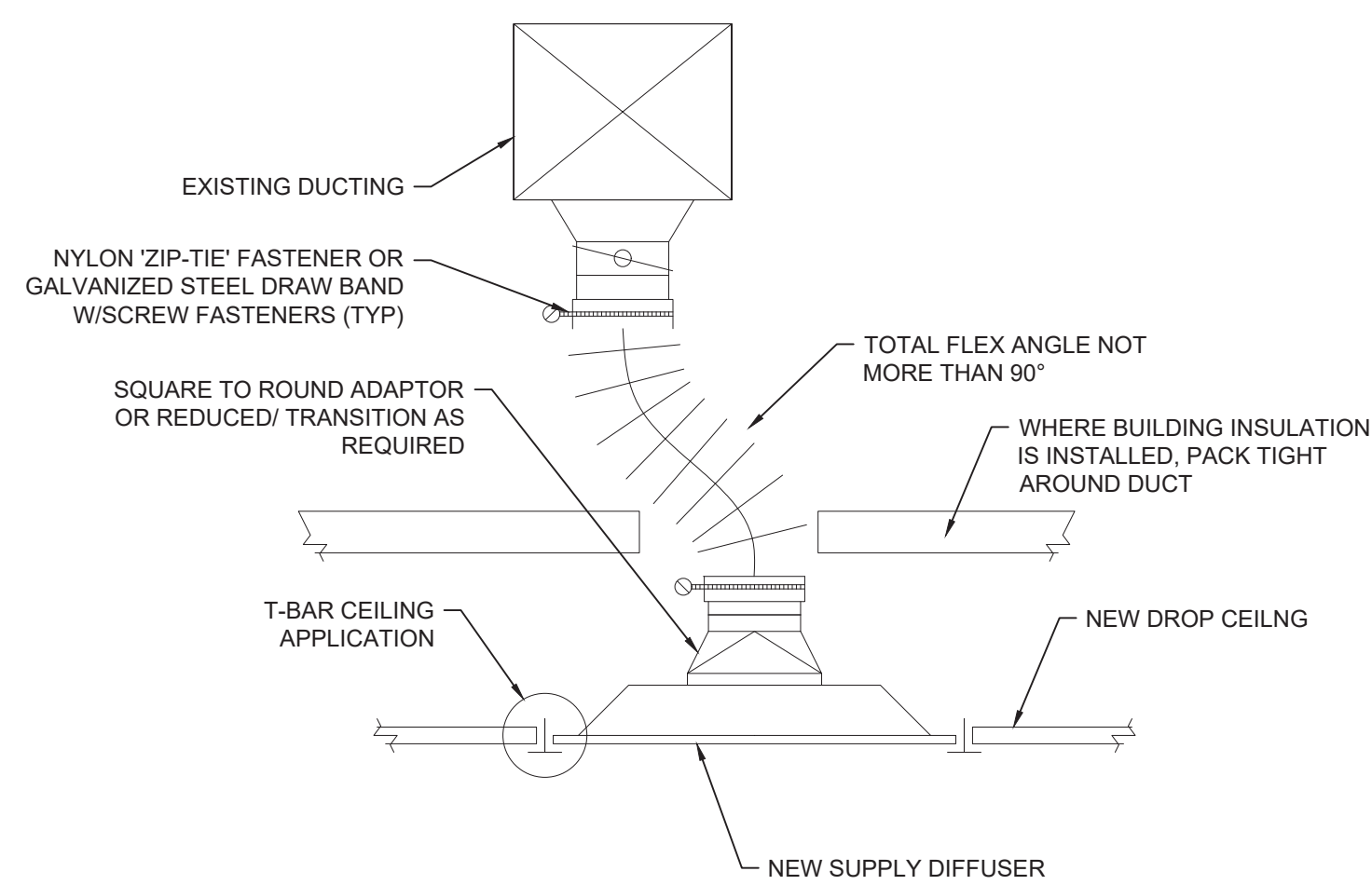


- NOTES:
1. PROVIDE SQUARE TO ROUND ADAPTER WITH STANDARD TOP INLET CONNECTION WHERE ADEQUATE CLEARANCE EXISTS ABOVE DIFFUSER.
 2. PROVIDE CONICAL DUCT COLLAR AT PLENUM CONNECTION TO ROUND NECK DIFFUSERS.

3 DIFFUSER BOX (LINED) DETAIL
SCALE: NOT TO SCALE



4 TYPICAL LAY-IN RETURN GRILLE CONNECTION
SCALE: NOT TO SCALE

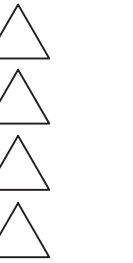


5 EXTENDED LAY-IN DIFFUSER CONNECTION
SCALE: NOT TO SCALE

GENERAL NOTES

1. FOR HARD LID DIFFUSER OR GRILLE REPLACEMENT, FOLLOW THE MOST APPROPRIATE DETAIL. SUBSTITUTE SURFACE MOUNT STYLE DIFFUSER FOR LAY-IN STYLE DIFFUSER. SUBSTITUTE GYP BOARD CEILING FOR T-BAR CEILING AND TILES.

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MECHANICAL DETAILS

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AIR OUTLET SCHEDULE

TAG	SERVICE	MANUFACTURER	MODEL NO.	TYPE	MATERIAL	MOUNTING	BORDER	PATTERN	BLADE SPACING, INCH	BLADE POSITION	BLADE DEFLECTION	NOTES
[S1]	SUPPLY	PRICE	PDMC	DIFFUSER	STEEL	LAY-IN	-	4-WAY ADJUSTABLE	N/A	N/A	ADJUSTABLE	1, 2, 3, 4
[S2]	SUPPLY	PRICE	PDMC	DIFFUSER	STEEL	SURFACE	-	4-WAY ADJUSTABLE	N/A	N/A	ADJUSTABLE	1, 2, 4
[R1]	RETURN	PRICE	PDDR	PERFARATED DIFFUSER	STEEL	LAY-IN	-	-	-	-	-	1, 2, 3, 4
[R2]	RETURN	PRICE	PDDR	PERFARATED DIFFUSER	STEEL	SURFACE	-	-	-	-	-	1, 2, 4
[E1]	EXHAUST	PRICE	PDDR	PERFARATED DIFFUSER	STEEL	LAY-IN	-	-	-	-	-	1, 2, 3, 4
[T1]	TRANSFER	PRICE	PDDR	PERFARATED DIFFUSER	STEEL	LAY-IN	-	-	-	-	-	1, 2, 3, 4

- NOTES:
1. FINISH SHALL BE WHITE ANODIC ACRYLIC PAINT.
 2. PROVIDE SQUARE TO ROUND TRANSITION AS REQUIRED.
 3. LAY-IN DIFFUSERS SHALL HAVE NOMINAL 24" x 24" CEILING MODULE SIZE.
 4. OR APPROVED EQUAL.



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MECHANICAL
 SCHEDULES

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Electrical Abbreviations & Symbol Legend

Abbreviations

A	AMPERE	VFD	VARIABLE FREQUENCY DRIVE
AC	ALTERNATING CURRENT, AIR CONDITIONING UNIT	W	WATT, WIRE
AHJ	AUTHORITY HAVING JURISDICTION	WAN	WIDE AREA NETWORK
AIC	AVAILABLE INTERRUPTING CAPACITY	WAP	WIRELESS ACCESS POINT
AF	AMPERE FRAME / AMPERE FUSED	WI-FI	WIRELESS FIDELITY
AFC	ABOVE FINISHED CEILING	W/	WITH
AFF	ABOVE FINISHED FLOOR	W/O	WITHOUT
AFG	ABOVE FINISHED GRADE	XFMR	TRANSFORMER
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	Y	WYE
ARMS	ARC FLASH REDUCTION MAINTENANCE SYSTEM	1P	ONE POLE
AT	AMPERE TRIP	2P	TWO POLE
AV	AUDIO / VIDEO	3P	THREE POLE
AWG	AMERICAN WIRE GAUGE	4P	FOUR POLE
BAS	BUILDING AUTOMATION SYSTEM		
BFG	BELOW FINISHED GRADE		
BLDG	BUILDING		
C	CONDUIT		
CAT	CATEGORY		
CB	CIRCUIT BREAKER		
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED		
CFOI	CONTRACTOR FURNISHED, OWNER INSTALLED		
CKT	CIRCUIT		
CPT	CONTROL POWER TRANSFORMER		
CR	CONTROL RELAY		
CU	COPPER		
dB	DECIBEL		
DC	DIRECT CURRENT		
DIM	DIMENSION		
DIV	DIVISION		
DTL	DETAIL		
DWG	DRAWING		
EL	ELEVATION		
EMT	ELECTRICAL METALLIC TUBING		
EOLR	END OF LINE RESISTOR		
FACP	FIRE ALARM CONTROL PANEL		
FF	FINISH FLOOR		
FLA	FULL LOAD AMPERES		
FT	FOOT, FEET		
FBO	FURNISHED BY OTHERS		
G, GND	GROUND		
GFCI	GROUND FAULT CIRCUIT INTERRUPTER		
HH	HAND HOLE		
HP	HORSEPOWER		
ID	IDENTIFICATION		
IDC	INITIATING DEVICE CIRCUIT		
IDC	INTERMEDIATE DISTRIBUTION FRAME		
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS		
IG	ISOLATED GROUND		
IT	INFORMATION TECHNOLOGY		
JB	JUNCTION BOX		
KAIC	THOUSAND AMPS INTERRUPTING CURRENT		
KCML	THOUSAND CIRCULAR MILS		
KVA	KILOVOLT-AMPERE		
KW	KILOWATT		
LAN	LOCAL AREA NETWORK		
LED	LIGHT EMITTING DIODE		
LS	LIMIT SWITCH		
LSI	ELECTRONIC TRIP UNIT ADJUSTABLE LONG TIME DELAY, SHORT TIME DELAY, INSTANTANEOUS TRIP		
LSIG	ELECTRONIC TRIP UNIT WITH ADJUSTABLE LONG TIME DELAY, SHORT TIME DELAY, INSTANTANEOUS TRIP, AND GROUND FAULT		
LV	LOW VOLTAGE		
MCA	MINIMUM CIRCUIT AMPACITY		
MCC	MOTOR CONTROL CENTER		
MCP	MOTOR CIRCUIT PROTECTOR		
MDF	MAIN DISTRIBUTION FRAME		
MHz	MEGAHERTZ		
MISC	MISCELLANEOUS		
MLO	MAIN LUGS ONLY		
MOCPP	MAXIMUM OVERCURRENT PROTECTION		
N	NEUTRAL		
NAC	NOTIFICATION APPLIANCE CIRCUIT		
N/A	NOT APPLICABLE		
NC	NORMALLY CLOSED		
NEC	NATIONAL ELECTRICAL CODE		
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION		
NL	NIGHT LIGHT		
NO	NORMALLY OPEN		
NTS	NOT TO SCALE		
OC	ON CENTER		
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED		
OFOI	OWNER FURNISHED, OWNER INSTALLED		
Ø	PHASE		
PB	PULL BOX, PANIC BUTTON, PUSH BUTTON		
PE	PHOTO EYE		
PNL	PANEL		
POE	POWER OVER ETHERNET		
PTZ	PAN, TILT, ZOOM		
RF	RADIO FREQUENCY		
RFI	REQUEST FOR INFORMATION		
SPD	SURGE PROTECTION DEVICE		
STD	STANDARD		
SW	SWITCH		
T/M	THERMAL MAGNETIC CIRCUIT BREAKER		
TBD	TO BE DETERMINED		
TV	TELEVISION / MONITOR OUTLET		
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR		
TYP	TYPICAL		
UH	UNIT HEATER		
UG	UNDERGROUND		
UL	UNDERWRITERS LABORATORIES		
UPS	UNINTERRUPTIBLE POWER SUPPLY		
UON	UNLESS OTHERWISE NOTED		
USB	UNIVERSAL SERIAL BUS		
V	VOLTS, VOLTAGE		
VA	VOLT-AMPERE		

General Electrical Notes

- ALL LIGHTING BRANCH CIRCUITS SHALL BE 2#10, 1#10G IN 3/4" CONDUIT, UON.
- ALL 20-AMP RECEPTACLE AND HARDWIRED BRANCH CIRCUITS SHALL BE 2#12, 1#12G IN 3/4" CONDUIT, UON.
- ALL EXIT SIGNS SHALL BE WIRED TO THE LOCAL LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING, UON.
- PROVIDE 0-10V DIMMING CONDUCTORS TO ALL LUMINAIRES WHICH ARE CONTROLLED BY 0-10V DIMMERS SHOWN ON THE DRAWINGS.

Drawing Symbol Variables

3	THREE WAY SWITCH.
4	FOUR WAY SWITCH.
#J	QUANTITY OF JACKS AND HORIZONTAL CABLES.
J	J = CAT6, JA = CAT6A, JE = CAT5E
+XX	MOUNTING UNITS EXPRESSED IN INCHES TO CENTERLINE ABOVE FINISHED FLOOR OR GRADE.
C	MOUNTED HORIZONTALLY AT 4" ABOVE COUNTERTOP.
CL	CLOCK.
DR	DUAL RELAY.
E	RED EMERGENCY SWITCH.
EL	ELEVATOR RECALL.
ETR	EXISTING DEVICE SHALL REMAIN.
G	GLASS BREAK SENSOR.
K	KEYED SWITCH.
LF	LOW FREQUENCY.
LV	LOW VOLTAGE SWITCH.
M	MOTOR RATED TOGGLE SWITCH.
NEX	REPLACE EXISTING WIRING DEVICE AND FACEPLATE WITH NEW, BACK BOX AND CONDUIT SHALL REMAIN.
O	INTEGRAL OCCUPANCY SENSOR.
P	ADA PHONE, VERIFY HEIGHT WITH ARCHITECT / OWNER.
REX	REMOVE EXISTING DEVICE / EQUIPMENT.
TK	MOUNTED IN TOE KICK OF CASEWORK.
TV	MOUNTED ADJACENT TO TV AT 60" AFF, UON.
V	VANDAL RESISTANT.
WG	WIREGUARD.
WP	WEATHERPROOF.

Annotation

(N)	INDICATES NEW EQUIPMENT.
(E)	INDICATES EXISTING EQUIPMENT TO REMAIN.
(D)	INDICATES EXISTING EQUIPMENT TO BE DEMOLISHED.
(RR)/(RD)	INDICATES EXISTING EQUIPMENT OR DEVICE TO BE REMOVED AND REINSTALLED.
PXXX	CONDUIT & CONDUCTOR CALLOUT. REFER TO CONDUIT & CONDUCTOR SCHEDULE.
KEYED XX	KEYED NOTE CALLOUT. REFER TO CORRESPONDING SHEET KEYNOTES.
XX	KEYED NOTE CALLOUT. REFER TO CORRESPONDING SHEET KEYNOTES.
XX-XX	MECHANICAL EQUIPMENT CALLOUT. REFER TO MECHANICAL EQUIPMENT CONNECTION SCHEDULE.
X EX XX	DETAIL CALLOUT. REFER TO DETAIL AND SHEET AS INDICATED ON CALLOUT.
XX-XX	FIXTURE MOUNTING CALLOUT. HEIGHT ABOVE FINISHED FLOOR (A.F.F.)
XXXXX	EQUIPMENT CALLOUT. REFER TO NEMA CONNECTION SCHEDULE.
SECTION XX	SECTION CALLOUT. REFER TO DETAIL AND SHEET AS INDICATED ON CALLOUT.
ELEVATION XX	ELEVATION CALLOUT. REFER TO DETAIL AND SHEET AS INDICATED ON CALLOUT.

Area Rescue Assistance

ABA	COMMAND UNIT.
AB-1	SPEAKER STROBE.
ABS	AREA OF RESCUE STATION.

Raceways

	CONDUIT AND/OR CONDUCTORS INSTALLED ABOVE GRADE, CONCEALED IN WALL OR CEILING SPACE.
	CONDUIT AND/OR CONDUCTORS INSTALLED BELOW GRADE, BELOW SLAB.
	CONDUIT TURNED DOWN.
	CONDUIT TURNED UP.
	CONDUIT STUBBED AND CAPPED.
	CONDUIT DIRECT CONNECTION TO EQUIPMENT.
	FLEXIBLE CONNECTION TO EQUIPMENT.
	CONDUIT / WIRING CONTINUATION.
	HOMERUN TO PANELBOARD.
	CABLE TRAY. SIZE AND TYPE AS INDICATED ON DRAWINGS.

Power Distribution

	DUPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	SIMPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	QUADPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	GFCI DUPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	GFCI QUADPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	TAMPERSPROOF DUPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	TAMPERSPROOF QUADPLEX RECEPTACLE, MOUNTED AT 18" AFF, UON.
	NEMA SPECIAL RECEPTACLE, MOUNTED AT 18" AFF, UON. NEMA CONFIGURATION AS INDICATED.
	SIDE HATCHED RECEPTACLE, TO BE WIRED TO SWITCHED CIRCUIT.
	CENTER HATCHED RECEPTACLE, TO BE WIRED TO EMERGENCY CIRCUIT.
	RECEPTACLE MOUNTED ON CEILING.
	RECEPTACLE MOUNTED IN-COUNTER.
	DISCONNECT SWITCH.
	FUSED DISCONNECT SWITCH.
	ENCLOSED CIRCUIT BREAKER.
	COMBINATION STARTER.
	FLOORBOX COMBINATION POWER & DATA.
	FLOORBOX POWER.
	POKETHRU COMBINATION POWER & DATA.
	POKETHRU POWER.
	POWER POLE.
	PANELBOARD SURFACE MOUNT.
	PANELBOARD FLUSH MOUNT.
	MAIN DISTRIBUTION PANEL.
	UTILITY CT METER.
	UTILITY TRANSFORMER.

Switches

	SINGLE POLE SWITCH - MOUNTED AT 42" AFF, UON.
	LOW VOLTAGE 0-10 VOLT DIMMING SWITCH - MOUNTED AT 42" AFF, UON.
	OCCUPANCY SENSOR - CEILING OR WALL MOUNTED.
	OCCUPANCY SENSOR POWER PACK.
	PHOTOCELL - CEILING OR WALL MOUNTED.
	ADA DOOR PUSHPLATE.
	EMERGENCY STOP SWITCH, MUSHROOM HEAD.
	PUSHBUTTON, SINGLE OR DOUBLE.

Lighting

	TROFFER LUMINAIRE, SURFACE, RECESS, OR PENDANT MOUNTED AS INDICATED ON THE DRAWINGS.
	DOWNLIGHT LUMINAIRE, SURFACE, RECESS, OR PENDANT MOUNTED AS INDICATED ON THE DRAWINGS.
	UNDERCABINET LUMINAIRE.
	EMERGENCY BATTERY PACK LUMINAIRE, WALL OR CEILING MOUNTED.
	LINEAR PENDANT MOUNTED LUMINAIRE.
	LINEAR WALL MOUNTED LUMINAIRE.
	BOLLARD LUMINAIRE.
	SITE LUMINAIRE POLE MOUNTED. NUMBER OF HEADS AS SHOWN.
	TRACK LUMINAIRE.
	SPOT LUMINAIRE.
	WALL MOUNTED LUMINAIRE.
	RING PENDANT LUMINAIRE.
	WALL WASH LUMINAIRE POINTED IN DIRECTION AS SHOWN.
	EXIT SIGN, WALL OR CEILING MOUNTED, SINGLE FACE WITH DIRECTIONAL CHEVRONS AS INDICATED ON DRAWINGS.
	EXIT SIGN, WALL OR CEILING MOUNTED, DOUBLE FACE WITH DIRECTIONAL CHEVRONS AS INDICATED ON DRAWINGS.
	HALF HATCHED LUMINAIRE TO BE WIRED TO EMERGENCY CIRCUIT
	FULL HATCHED LUMINAIRE TO BE WIRED TO NIGHTLIGHT CIRCUIT.

Low Voltage

	ETHERNET OUTLET MOUNTED AT 18" AFF, UON.
	COAXIAL OUTLET MOUNTED AT 18" AFF, UON.
	PHONE OUTLET MOUNTED AT 18" AFF, UON.
	LOW VOLTAGE OUTLET CEILING MOUNTED.
	WIRELESS ACCESS POINT CEILING MOUNTED.
	WIRELESS ACCESS POINT WALL MOUNTED.
	DIGITAL CLOCK.
	FLOORBOX DATA.
	POKETHRU DATA.
	IT RACK.
	VERTICAL WIRE MANAGEMENT.

Access Control & Security

	ACCESS CONTROL - DOOR CONTACT. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - CARD READER. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - ELECTRIC STRIKE. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - KEY PAD. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - MAGNETIC LOCK. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - REQUEST TO EXIT. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - ELECTRIFIED PANIC BAR. PROVIDE 3/4" CONDUIT FROM DOOR FRAME TO ACCESSIBLE CEILING OR SECURITY JUNCTION BOX AS SHOWN ON THE DRAWINGS.
	ACCESS CONTROL - SECURITY JUNCTION BOX. SIZED AS RECOMMENDED BY SECURITY SYSTEM MANUFACTURER.
	ACCESS CONTROL - CAMERA / INTERCOM.
	ACCESS CONTROL - PANIC BUTTON.
	SECURITY CAMERA - CEILING MOUNTED. PROVIDE ONE (1) CAT6.
	SECURITY CAMERA - WALL MOUNTED. PROVIDE ONE (1) CAT6.
	INTRUSION SENSOR - CEILING MOUNTED.
	INTRUSION SENSOR - WALL MOUNTED.
	INTRUSION KEYPAD.

Fire Alarm

	FIRE ALARM AUDIO/VISUAL - WALL MOUNTED. CANDELA RATING AS SHOWN ON DRAWING.
	FIRE ALARM VISUAL - WALL MOUNTED. CANDELA RATING AS SHOWN ON DRAWING.
	FIRE ALARM AUDIO/VISUAL - CEILING MOUNTED. CANDELA RATING AS SHOWN ON DRAWING.
	FIRE ALARM VISUAL - CEILING MOUNTED. CANDELA RATING AS SHOWN ON DRAWING.
	FIRE ALARM BELL.
	FIRE ALARM SMOKE DETECTOR - CEILING MOUNTED.
	FIRE ALARM SMOKE DETECTOR - WALL MOUNTED.
	FIRE ALARM HEAT DETECTOR - CEILING MOUNTED.
	FIRE ALARM HEAT DETECTOR - WALL MOUNTED.
	FIRE ALARM DUCT SMOKE DETECTOR.
	FIRE ALARM DUCT SMOKE DETECTOR WITH REMOTE TEST STATION.
	FIRE ALARM MANUAL PULL STATION - WALL MOUNTED.
	FIRE ALARM MANUAL TAMPERSWITCH.
	FIRE ALARM MANUAL FLOW SWITCH.
	FIRE ALARM MANUAL PRESSURE SWITCH.
	FIRE ALARM MONITOR MODULE.
	FIRE ALARM RELAY INPUT.
	FIRE ALARM RELAY OUTPUT.
	FIRE ALARM POST INDICATOR VALVE.
	FIRE ALARM SURGE ARRESTOR.
	FIRE ALARM ISOLATION MODULE.
	FIRE ALARM ANNUNCIATOR.
	FIRE ALARM MAGNETIC DOOR HOLD.

Audio/Visual

	AV OUTLET - WALL MOUNTED AT 18" AFF, UON. SEE AUDIO VISUAL DETAILS FOR CONFIGURATIONS.
	AUDIO VIDEO OUTLET - CEILING MOUNTED.
	AUDIO SPEAKER - WALL MOUNTED AT 96" AFF, UON.
	AUDIO SPEAKER - CEILING MOUNTED.
	PAGING SPEAKER - WALL MOUNTED AT 96" AFF, UON.
	PAGING SPEAKER - CEILING MOUNTED.
	PAGING HORN - WALL MOUNTED AT 96" AFF, UON.
	INTERCOM SPEAKER - WALL MOUNTED AT 96" AFF, UON.
	INTERCOM SPEAKER - CEILING MOUNTED.
	INTERCOM CALL BUTTON - MOUNTED AT 42", UON.
	ADMINISTRATION CONSOLE. PROVIDE ONE (1) CAT6 CABLE.
	AV PROJECTOR - CEILING MOUNTED.
	AUDIO ENHANCEMENT DEVICE.

Miscellaneous

	JUNCTION BOX (ROUND, SQUARE).
	THERMOSTAT.
	RELAY.
	CORD REEL.
	MOTOR / EXHAUST FAN.
	CEILING FAN.
	UTILITY POLE.
	WEATHERHEAD.
	GROUND ROD.
	GROUND ROD WITH TEST WELL.
	SURFACE RACEWAY / WIREMOLD.
	FIRE RATED BACKBOARD.
	GROUND BUS BAR.

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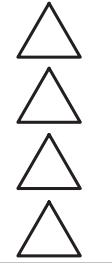
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230 SW MILL STREET
SHERIDAN, OR 97378
consultants:

revisions:



date: 06-03-2021

project: 00419

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ELECTRICAL

SYMBOL LEGEND

& ABBERRIVATIONS

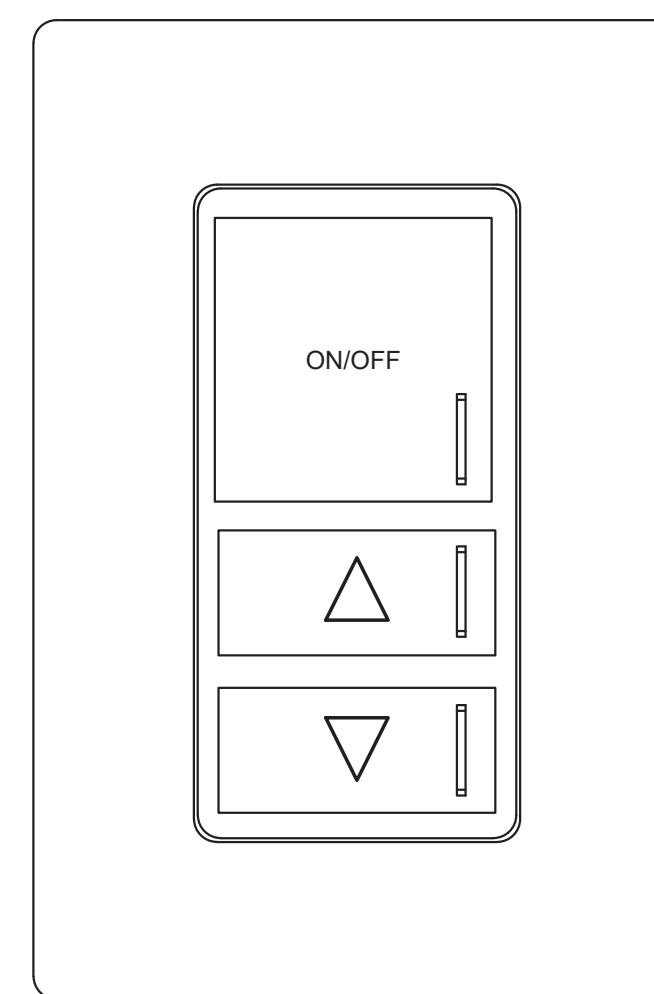
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LUMINAIRE SCHEDULE												
FIXTURE NO.	DESCRIPTION	LAMP TYPE	LUMENS	CRI	COLOR TEMP.	DRIVER	EMERGENCY DRIVER	INTEGRAL MOTION/PHOTO SENSOR	VOLTS	LOAD	MFR.	MODEL NUMBER
D4	RECESSED OPEN 4" DIAMETER, 5.5" HIGH DOWNLIGHT, DIE-CAST ALUMINUM HOUSING, 50 DEGREE MEDIUM DISTRIBUTION, WHITE PAINTED SELF-FLANGED, SEMI-SPECULAR CLEAR FINISH, AND DAMP LOCATION LISTED. nLIGHT AIR ENABLED.	LED	1,500 LM	80	3500K	STANDARD 0-10V	NO	NO	UNV	16 WATTS	INDY	L4 SERIES
RA4	RECESSED 2' x 4' x 3-1/4"H RECESSED TROFER, INDIRECT LUMINAIRE, SMOOTH LENS WITH ROUND PATTERN INSERT, COLD ROLLED STEEL HOUSING, AND WHITE ENAMEL FINISH. INTEGRAL MOTION SENSOR AND NLIGHT AIR ENABLED. UL LISTED.	LED	4,000 LM	80	3500K	STANDARD 0-10V	NO	YES	UNV	31 WATTS	LITHONIA	2BLT4 SERIES
RA4	SAME AS RA4 EXCEPT WITH EMERGENCY DRIVER.	LED	4,000 LM	80	3500K	STANDARD 0-10V	YES	YES	UNV	31 WATTS	LITHONIA	2BLT4 SERIES
X1	EXIT SIGN WITH WHITE POLYCARBONATE HOUSING, GREEN LETTERS AND CHEVRONS, UL 924 LISTED, AND DAMP LOCATION LISTED. PROVIDE NI-MH BATTERY BACKUP FOR A MINIMUM OF 90 MINUTES OF ILLUMINATION IN THE EVENT OF POWER LOSS. PROVIDE QUANTITY OF FACES AND CHEVRONS WITH DIRECTIONS AS SHOWN ON THE DRAWINGS.	LED	NA	NA	NA	NA	YES	NO	UNV	1 WATTS	LITHONIA	EXRG EL M6



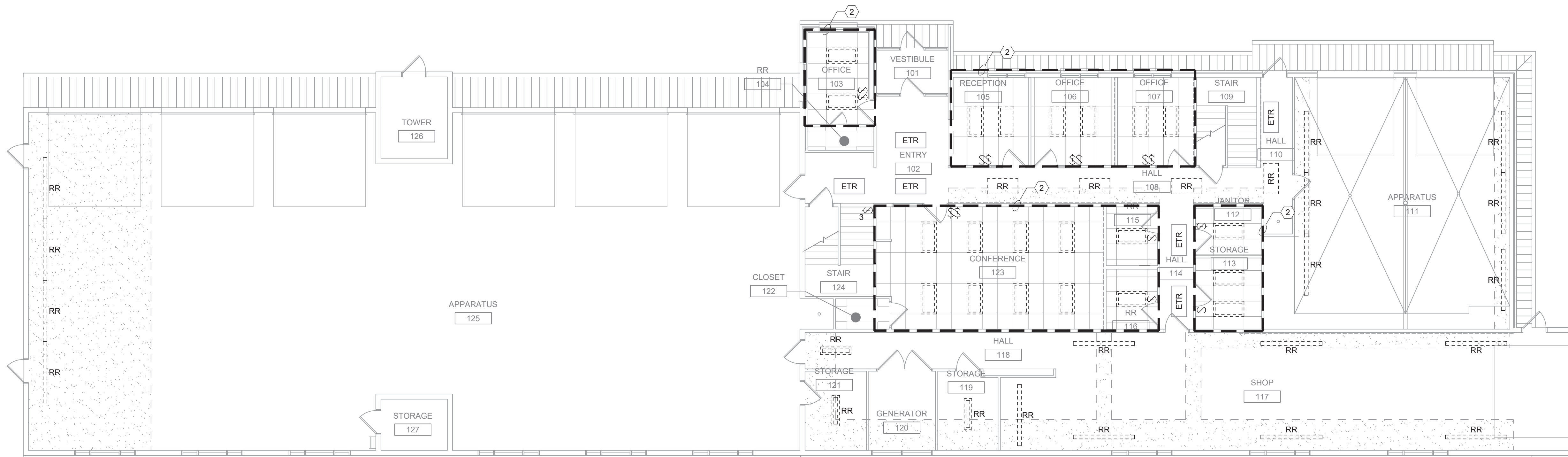
PART: nPODM DX
 STYLE: 1-GANG 3 BUTTON
 ROOM #:
 TAG: LV1

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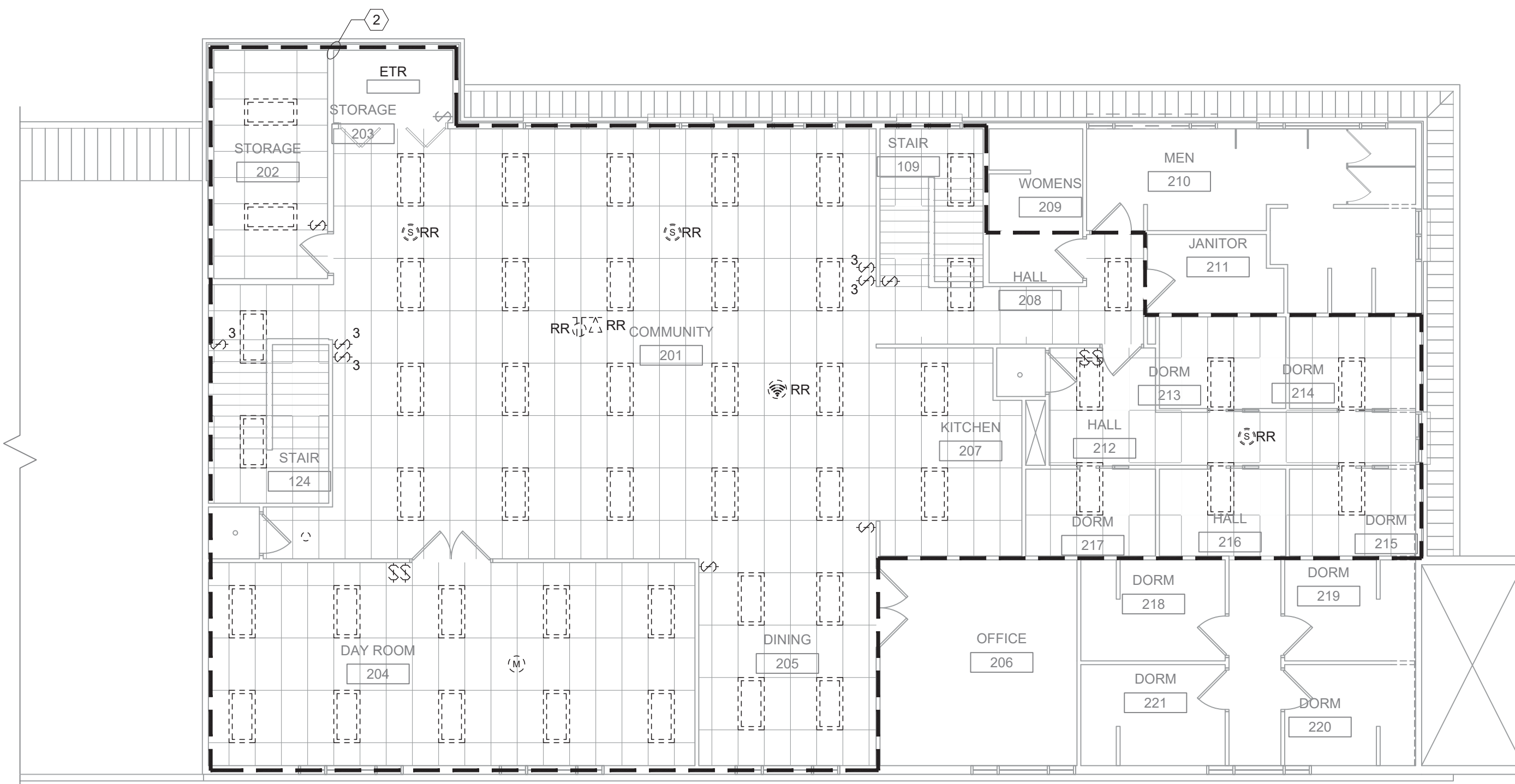
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LUMINAIRE SCHEDULE



1 1ST FLOOR LIGHTING DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



1 2ND FLOOR LIGHTING DEMOLITION PLAN
SCALE: 1/8" = 1'-0"

- SHEET KEY NOTES**
1. REMOVE FACEPLATE AND DEVICE, SAFE OFF CONDUCTORS FOR CEILING PROJECTOR, PROTECT BOX, CONDUIT, AND CONDUCTORS. PROVIDE NEW DEVICE AND FACEPLATE AND INSTALL IN EXISTING BOX, TERMINATE TO EXISTING CONDUCTORS.
 2. LIGHTING BRANCH CIRCUIT CONDUIT AND WIRING SHALL BE REMOVED TO THE NEAREST JUNCTION BOX. THE CIRCUIT SHALL BE RE-USED AND EXTENDED.

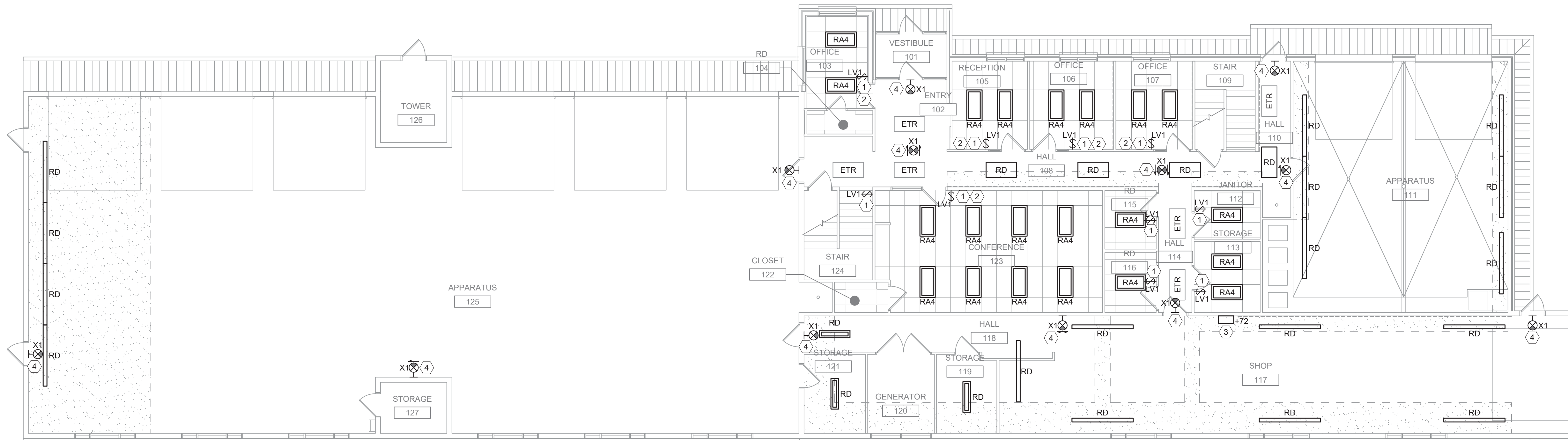
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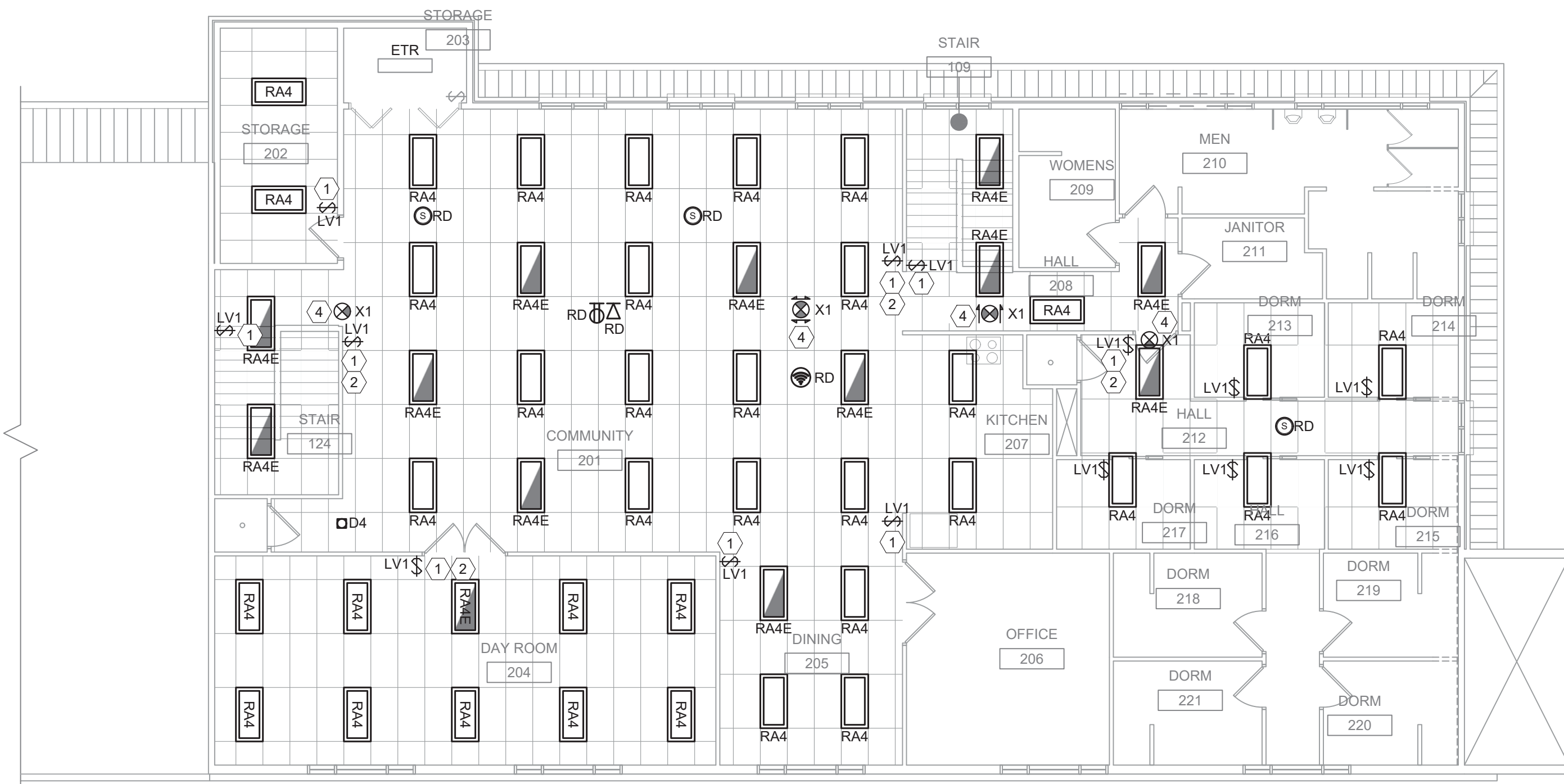
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LIGHTING DEMOLITION PLAN
sheet: **E2.0**
of:



1
1ST FLOOR LIGHTING PLAN
SCALE: 1/8" = 1'-0"



1
2ND FLOOR LIGHTING PLAN
SCALE: 1/8" = 1'-0"

- GENERAL SHEET NOTES**
- CONNECT NEW LIGHT FIXTURES TO EXISTING LIGHTING BRANCH CIRCUIT IN ROOM.
- SHEET KEY NOTES**
- INTERCEPT AND EXTEND LIGHTING BRANCH CIRCUIT CONDUIT AND WIRING MADE AVAILABLE DURING DEMOLITION.
 - PROVIDE BLANK COVER PLATE FOR UNUSED SWITCH BOX.
 - INSTALL NLIGHT AIR ECLYPSE MODULE ABOVE EXISTING PANEL C. CONNECT TO PANEL C, CIRCUIT #47.
 - CONNECT NEW EXIT SIGN TO NEAREST UNSWITCHED LIGHTING BRANCH CIRCUIT.

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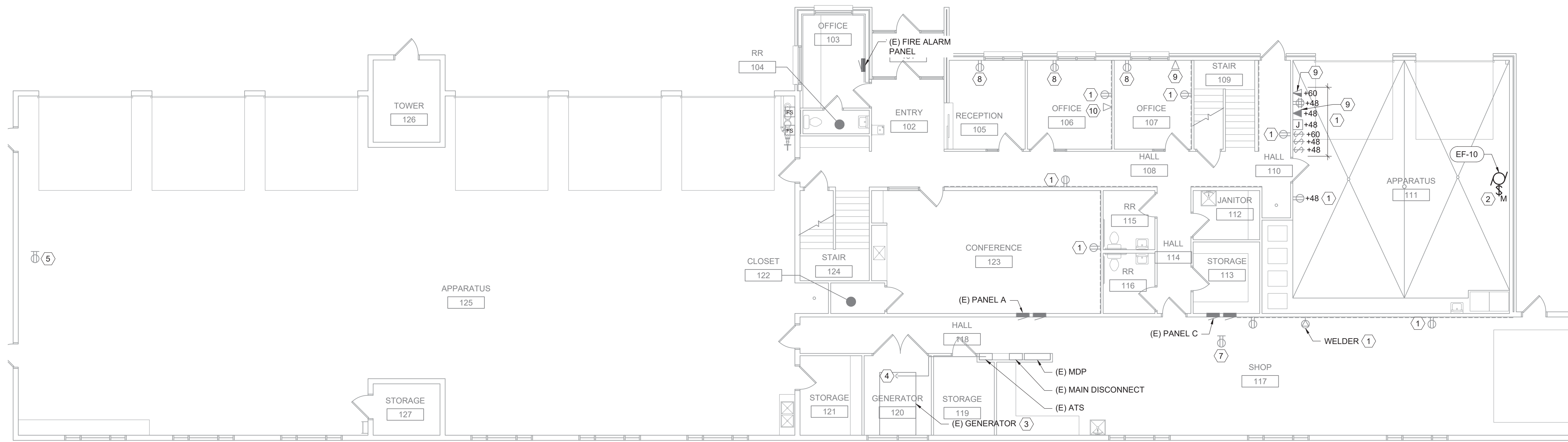
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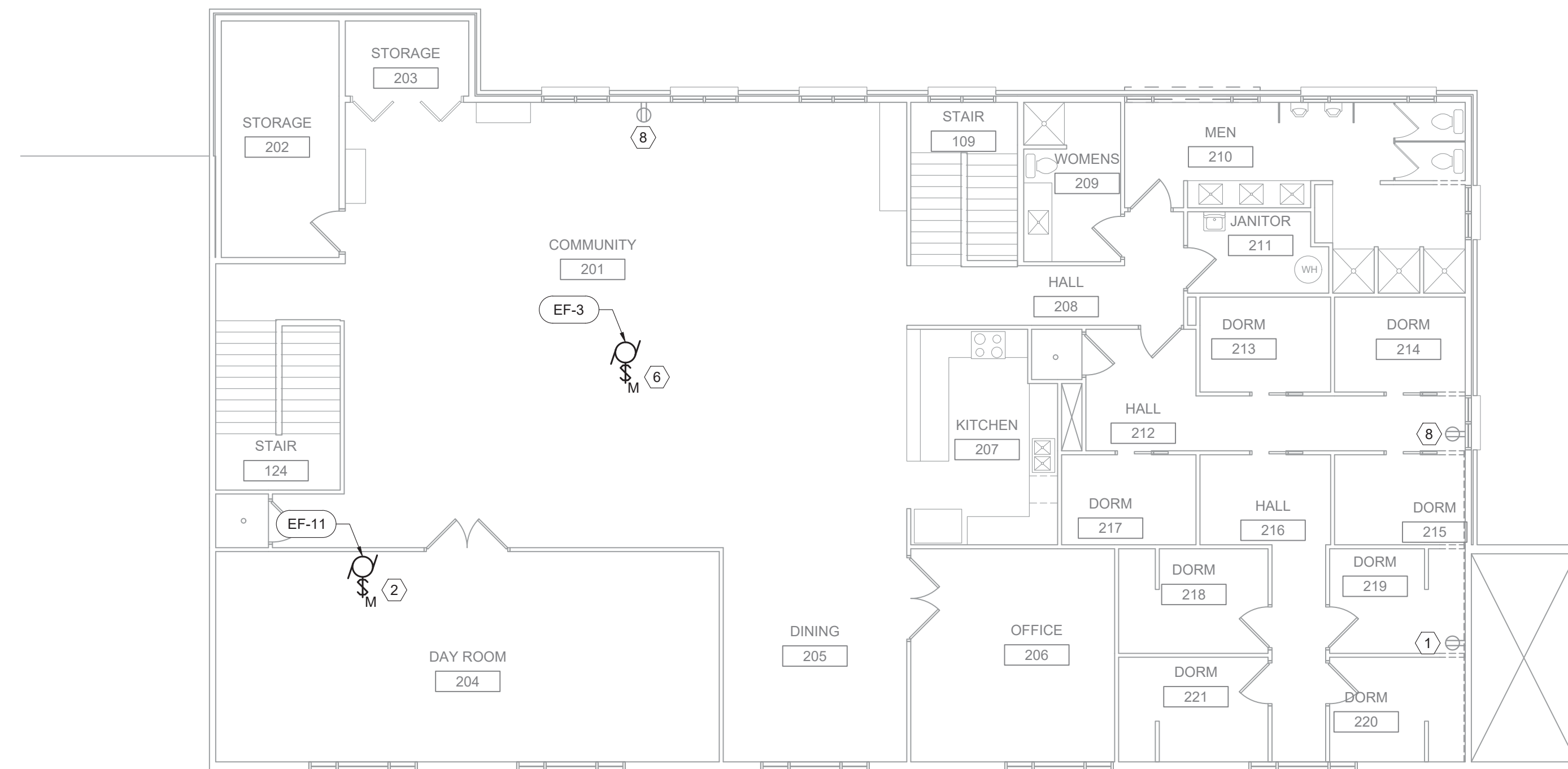
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LIGHTING PLAN

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1 1ST FLOOR
POWER DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



1 2ND FLOOR
POWER DEMOLITION PLAN
SCALE: 1/8" = 1'-0"

- SHEET KEY NOTES**
- ADDITIONAL LAYER OF GYPBOARD TO BE INSTALLED ON WALL. SEE STRUCTURAL DRAWINGS FOR THICKNESS AND LOCATION. REMOVE EXISTING FACEPLATE AND DEVICE. INSTALL EXTENSION RING TO BRING DEVICE FLUSH WITH NEW GYPBOARD. PROVIDE NEW DEVICE AND FACEPLATE AND INSTALL IN EXISTING BOX, TERMINATE TO EXISTING CONDUCTORS.
 - DISCONNECT EXISTING EXHAUST FAN AND SAFE OFF CONDUCTORS. RE-TERMINATE CONDUCTORS ONCE EXHAUST FAN HAS BEEN RE-INSTALLED. COORDINATE WITH HVAC CONTRACTOR PRIOR TO BEGINNING WORK.
 - VERIFY EXISTING ANCHORS MEET CURRENT STRUCTURAL CODE. REPLACE IF REQUIRED.
 - EXISTING 2.5" EMT CONDUIT FROM ATS TO GENERATOR. DISCONNECT EXISTING CONDUIT AND CONDUCTORS FROM GENERATOR. REMOVE 4' OF EMT CONDUIT ON THE GENERATOR END. REPLACE WITH NEW 2.5" FLEXIBLE CONDUIT. RE-CONNECT EXISTING CONDUCTORS AND NEW FLEX CONDUIT TO GENERATOR.
 - EXISTING CEILING TO BE REMOVED FOR STRUCTURAL INSTALLATION. REMOVE EXISTING DEVICE AND BOX. SAFE OFF EXISTING CONDUCTORS SO THEY ARE OUT OF THE DEMOLITION AREA. INSTALL NEW BOX AND DEVICE WHEN CEILING HAS BEEN INSTALLED AND CONNECT TO EXISTING CONDUCTORS.
 - DISCONNECT EXISTING EXHAUST FAN AND SAFE OFF CONDUCTORS IF NECESSARY. COORDINATE WITH HVAC CONTRACTOR PRIOR TO BEGINNING WORK. RE-TERMINATE CONDUCTORS ONCE EXHAUST FAN HAS BEEN RE-INSTALLED.
 - REMOVE AND RE-INSTALL CEILING MOUNTED RECEPTACLE FOR RADIANT HEATERS.
 - REMOVE FACEPLATE AND DEVICE. SAFE OFF CONDUCTORS. PROTECT BOX, CONDUIT, AND CONDUCTORS. PROVIDE NEW DEVICE AND FACEPLATE AND INSTALL IN EXISTING BOX, TERMINATE TO EXISTING CONDUCTORS.
 - REMOVE FACEPLATE AND DEVICE. SAFE OFF CONDUCTORS. PROVIDE BOX, CONDUIT, AND CONDUCTORS. REINSTALL EXISTING DEVICE AND FACEPLATE.
 - ADDITIONAL LAYER OF GYPBOARD TO BE INSTALLED ON WALL. SEE STRUCTURAL DRAWINGS FOR THICKNESS AND LOCATION. REMOVE EXISTING FACEPLATE AND DEVICE. INSTALL EXTENSION RING TO BRING DEVICE FLUSH WITH NEW GYPBOARD. REINSTALL EXISTING DEVICE AND FACEPLATE.

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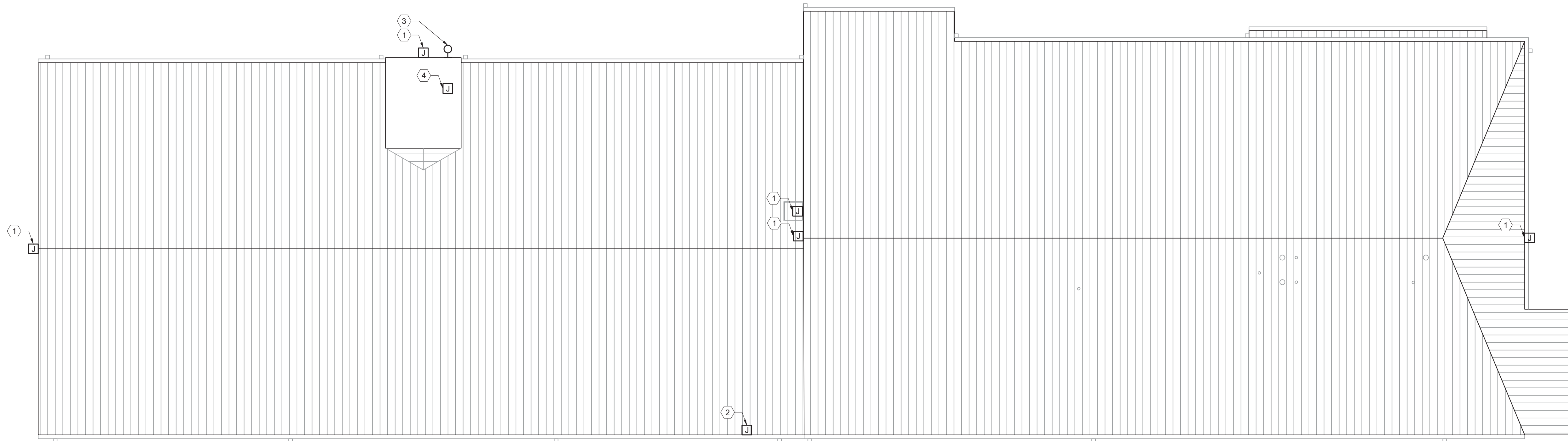
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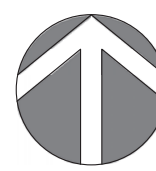
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POWER DEMOLITION PLAN
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1 ELECTRICAL ROOF DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



SHEET KEY NOTES

1. REMOVE EXISTING ANTENNA AND TOWER SUPPORT FOR REMOVAL OF ROOF BY OTHERS. RE-INSTALL ANTENNA AND TOWER AFTER NEW ROOF HAS BEEN INSTALLED. VERIFY FUNCTIONAL OPERATION ONCE RE-INSTALL IS COMPLETE.
2. REMOVE EXISTING SATELLITE DISH, SUPPORTS, AND SURFACE MOUNTED CONDUIT/CONDUCTORS FOR REMOVAL OF ROOF BY OTHERS. RE-INSTALL SATELLITE DISH, SUPPORTS, AND CONDUIT CONDUCTORS AFTER NEW ROOF HAS BEEN INSTALLED. VERIFY FUNCTIONAL OPERATION ONCE RE-INSTALL IS COMPLETE.
3. REMOVE EXISTING LIGHT FOR REMOVAL OF EXISTING ROOF FLASHING BY OTHERS. PROTECT BOX AND SAFE-OFF CONDUCTORS. RE-INSTALL LIGHT ONCE NEW FLASHING HAS BEEN INSTALLED. VERIFY FUNCTIONAL OPERATION ONCE RE-INSTALL IS COMPLETE.
4. REMOVE EXISTING SIREN TOWER, SUPPORTS, AND SURFACE MOUNTED CONDUIT/CONDUCTORS FOR REMOVAL OF ROOF BY OTHERS. RE-INSTALL SIREN TOWER, SUPPORTS, AND CONDUIT/CONDUCTORS AFTER NEW ROOF HAS BEEN INSTALLED. VERIFY FUNCTIONAL OPERATION ONCE RE-INSTALL IS COMPLETE.

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