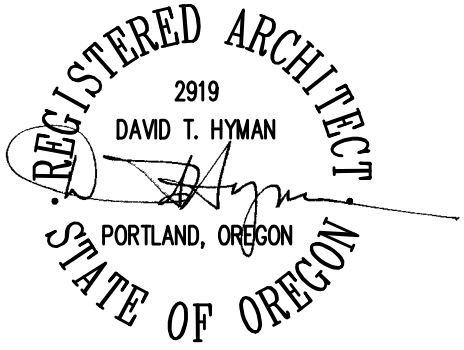

Project Manual

WOODBURN CITY HALL REMODEL & HVAC UPGRADE

100% Construction Documents

December 14, 2018

100% CONSTRUCTION DOCUMENTS
PROJECT MANUAL

WOODBURN CITY HALL REMODEL & HVAC UPGRADE

270 Montgomery Street
Woodburn, OR 97071

December 14, 2018

Owner
CITY OF WOODBURN PUBLIC WORKS
190 Garfield Street
Woodburn, OR 97071
(503) 982-5241
Eric Liljequist

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END OF SECTION

BID SOLICITATION

The Woodburn City Hall Remodel & HVAC Upgrade Project consists of remodeling the existing city hall building and providing a new HVAC system. Work includes new and altered walls, doors, finishes, ceiling, lighting and other architectural elements throughout most of the building. The existing HVAC system will be removed and a new system installed. Exterior work includes new HVAC units, roofing, roof well cladding and select site ADA improvements.

The City of Woodburn Public Works will receive sealed bids in writing from qualified contractors until 2:00 pm local time, Thursday, January 17, 2019 at City of Woodburn Public Works, 190 Garfield Street, Woodburn OR, 97071 for construction of the Woodburn City Hall Remodel & HVAC Upgrade Project. Bids received after the time fixed for receiving bids will not be considered.

The First-Tier Subcontractor Disclosure Form must be submitted in a separate envelope within two (2) business hours after the advertised bid closing time.

PRE-BID CONFERENCE: A pre-bid conference will be held at 10:00 am local time, Thursday, December 20, 2018 at the Woodburn City Hall, 270 Montgomery Street, Woodburn OR 97071. This pre-bid conference is not mandatory, but prospective bidders are encouraged to attend.

BID DOCUMENTS FOR CONTRACTORS AND SUBCONTRACTORS: May be examined at the City of Woodburn Public Works Director's Office, 190 Garfield St., Woodburn, OR on or after **Thursday, December 13, 2018.** Electronic plan sets are available for viewing and downloading on the Engineering Division's website at: **http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps** and/or may have been downloaded by the following plan centers.

DJC Plan Center – Portland, OR
Contractor's Plan Center – Clackamas, OR
Salem Contractor's Exchange – Salem, OR

BID DOCUMENTS FOR PLAN CENTERS: Bid Sets are available electronically for viewing and downloading on the Engineering Division's website at: **http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps** or by contacting Eric Liljequist, Public Works Director, City of Woodburn Public Works, 503-982-5240.

No bid shall be considered unless the bid contains a statement by the bidder, as part of his bid, that the provisions required by ORS 279C.800 through ORS 279C.870 (workers on public works to be paid not less than prevailing rate of wage) shall be included in his contract. The current wage rates applicable to this project are available at www.boli.state.or.us.

No bid will be considered unless accompanied by certified check, cashier's check, or bid bond made payable to City of Woodburn Public Works in an amount equal to ten percent (10%) of the Basic Bid. Interest will not be allowed on bid security.

It shall be understood and mutually agreed by and between the Contractor and Owner that the date of beginning and time for completion of the project are essential conditions of the contract and that the time for beginning and completion of the project shall be considered by the Owner in awarding the contract. The bidder shall state the proposed number of construction days on the Bid Form.

No bidder may withdraw his bid after the hour set for the opening thereof, or thereafter, before award of the contract, unless award is delayed for a period exceeding thirty (30) days from the Bid Opening date.

BID SOLICITATION

The Owner reserves the right to waive any irregularities in the bids, to reject any or all bids, and to accept only such bids as may be in the Owner's best interest.

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.1 SUMMARY

A. This construction will be carried out under one General Construction Agreement covering the construction work on this project. "The General Conditions of the Contract for Construction" of the American Institute of Architects will be referred to as the "General Conditions" throughout this Project Manual. This agreement includes all labor, materials, transportation, equipment and services necessary for and reasonably incidental to the completion of all work in connection with the project described in this Project Manual and the accompanying Drawings.

1.2 DEFINITIONS

A. Bid Documents include the Bid Solicitation, Instructions to Bidders, the Bid Form and the Contract Documents, including any addenda issued prior to receipt of bids. Addenda are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bid Documents, including Drawings and Project Manual, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.

B. Project Notifications: Addenda, clarifications, etc. shall be posted on the Agency website and are the responsibility of the Contractor to download before submission of bids. Contractor shall sign and submit with offer, all Addenda associated (posted on website) with the project. Agency website is **http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps**

1.3 DESCRIPTION OF BID ITEMS

A. Basic Bid: This project includes remodeling the existing city hall building and providing a new HVAC system. Work includes new and altered walls, doors, finishes, ceiling, lighting and other architectural elements throughout most of the building. The existing HVAC system will be removed and a new system installed. No change of occupancy is proposed. Exterior work includes new HVAC units, roofing, roof well cladding and select site ADA improvements. IT department areas are to remain operational during construction, and remodeling in that area will be minimal.

B. Allowances: As defined in Division 1 Section “Allowances.”

C. Unit Prices: As defined in Division 1 Section "Unit Prices."

D. Alternates: Deductive in nature, defined in Division 1 Section "Alternates."

1.4 HOURS OF LABOR

A. Section 279C.520, Oregon Revised Statutes, provides that in all cases where labor is employed by the state, county, school district, municipality, municipal corporation or subdivision, through a Contractor, no person shall be required or permitted to labor more than 10 hours in any one day, nor more than 40 hours in any one week, except in the case of necessity, emergency, or where the public policy absolutely requires it, in which event the person or persons so employed for excessive hours shall receive at least time and one-half pay for all overtime in excess of 10

hours per day or 40 hours in any one week, and for work performed on Saturdays and legal holidays. Other provisions of ORS 279C.520 may apply.

1.5 RESPONSIBLE BIDDER QUALIFICATION

A. The Owner reserves the right to require each Contractor to provide a completed Contractor's Information, Equipment and Experience Questionnaire (contained in Bidding Requirements Document "Bidders Qualification Form") to assist in the evaluation to determine the "Lowest Responsible Bidder." This questionnaire is not a pre-qualification requirement, but must be submitted to the Agency prior to the bid deadline. Refer to Division 0 Section “Bidders Qualification Form.”

1.6 COMPLIANCE WITH LAWS

A. In addition to specific statutory provisions cited, the Contractor shall comply with all other applicable requirements of Chapter 279C – Public Contracting, Oregon Revised Statutes.

1.7 BIDDER'S REPRESENTATION

A. Each bidder by making his bid represents that he has read and understands the Bid Documents, and has familiarized himself with the locale, site and conditions under which his work is to be performed. The Contractor's signature on his bid indicates acceptance of the conditions at the site of the work upon which he is bidding. The Contractor will be held responsible for the completion of all necessary work in accordance with the Drawings and Project Manual.

B. Complete sets of Bid Documents shall be used in preparing bids. Neither the Owner nor the Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid Documents.

1.8 INTERPRETATION OF CONTRACT DOCUMENTS

A. If any person contemplating the submission of a bid for the proposed construction finds discrepancies in or omissions from, or is in doubt as to the true meaning of any part of the Drawings and Project Manual, or forms of Contract Documents, he shall request an interpretation thereof, at least seven days previous to the date on which bids are to be opened. Any interpretation or correction will be issued as an Addendum by the Architect. Only a written interpretation or correction by Addendum shall be binding.

1.9 APPROVAL OF MATERIALS

A. Each bidder represents that his bid is based upon the materials, services, and equipment described in the Bid Documents. No substitution will be considered unless written request is submitted in accordance with Division 1 Section "Product Requirements," to the Architect for review by 3:00 p.m. seven days prior to bid date.

1.10 SUBMISSION OF BID

A. All bids must be prepared on the forms provided by the Architect and submitted in accordance with the Instructions to Bidders. A bid is invalid if it has not been deposited at the designated

location prior to the time and date for receipt of bids indicated in the Advertisement to Bid, or prior to any extension thereof issued to the bidders.

B. Unless otherwise provided in any supplement to these Instructions to Bidders, no bidder shall modify, withdraw, or cancel his bid or any part thereof for 30 days after the time designated for the receipt of bids in the Advertisement to Bid. Prior to the receipt of bids, Addenda will be mailed or delivered to each Contractor recorded by the Architect as having received the Bid Documents and will be available for inspection wherever the Bid Documents are kept available for that purpose. Enclose the bid with attachments in a sealed envelope with the following address and identification on the face:

[Bidder's Name]
[Bidder's Address]
Bid For: Woodburn City Hall Remodel & HVAC Upgrade

1.11 TELEGRAPHIC MODIFICATION AND FACSIMILE TRANSMISSION

A. Any bidder may modify his bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within 48 hours after closing time, no consideration will be given to the telegraphic modification.

B. Facsimile transmissions will be accepted only if handled through a third party and are received by the Owner in a sealed envelope and clearly marked BID as shown above, which includes a fax of all required documents. Electronically transmitted bids will not be accepted unless the original documents, together with all necessary signatures including any bond or other required documents, are received by the Owner within 48 hours after the actual scheduled opening.

1.12 BID GUARANTEE

A. Attach bid security to all bids in the form of a surety bond, cashier's check, or certified check of the bidder in the amount equal to ten percent (10%) of the Basic Bid amount made payable to City of Woodburn Public Works as a guarantee that bidder will, if awarded the Contract, execute same and furnish the specified performance and labor and materials payment bond.

B. The Owner reserves the right to hold the bid security of the two lowest bidders until a Contract is signed, or for 30 calendar days, whichever is less. All other bid security will be returned as soon as practical. Any bidder refusing to enter into a Contract and furnish specified bonds within five calendar days after notification that his bid has been accepted, shall forfeit his bid security to the Owner as liquidated damage, but not as a penalty. Bids rejected by the Bid Irregularity Guidelines as stated in this Section shall not cause forfeiture of the bid security by the bidder.

1.13 METHOD OF AWARD

A. If the lowest basic bid by a responsible bidder does not exceed the amount of funds estimated by the Owner as available to finance the contract, the contract may be awarded on the base bid, but

the Owner shall have sole discretion in also considering the beginning and completion time of the project in rejecting any base bid.

B. At Owner's discretion, Owner may include one or more bid alternates (additive or deductive) as selected by Owner when comparing bids.

C. The Owner reserves the right to reject any or all bids as permitted by Oregon Statute or Administrative Rule and to consider the competency and responsibility of bidders and of their proposed subcontractors in making the award.

1.14 FORM OF AGREEMENT

A. The "Standard Form of Agreement Between Owner and Contractor for a Project of Limited Scope" AIA Document A104-2017, shall be used in executing this Contract.

B. The contract shall contain a provision that the Contractor shall pay and perform according to the conditions required by ORS 279C.800 to 279C.870, Prevailing Wage Rate.

1.15 PERFORMANCE BOND

A. The successful bidder shall promptly furnish a Performance Bond, which shall be an Oregon Public Works Contract Bond, in compliance with the requirements of Chapter 279C.380, Oregon Revised Statutes, in an amount equal to 100 percent of the cost of the work, such bond to be written by properly qualified surety authorized to do business in the State of Oregon.

1.16 PROHIBITIONS OF ALTERATIONS (BID FORM)

A. Except as otherwise provided herein, bids that are incomplete or are conditioned in any way, contain erasures, alterations, or items not called for in the bid, or are not in conformity with the law, may be rejected by the Owner as informal. The Bid Form invites bids on definite Drawings and Project Manual. Only the amounts and information asked for in the Bid Form will be considered as the Bid. Each bidder shall bid upon the work exactly as specified and as provided in the Bid Form.

1.17 DISCLOSURE OF FIRST TIER SUBCONTRACTORS

A. Without regard to the amount of a Bidder's Bid, if the Agency's cost range for a public improvement Project in the "Invitation to Bid", or in other advertisement or solicitation documents, exceeds $100,000, the Bidder shall, within 2 working hours of the time Bids are due to be submitted, submit to the Agency, on a form provided by the Agency, a disclosure identifying any first-tier Subcontractors that will furnish labor or labor and Materials, and whose contract value is equal to or greater than:

1. 5% of the total Project Bid, but at least $15,000; or

2. $350,000, regardless of the percentage of the total Project Bid.

B. For each Subcontractor listed, Bidders shall state:

1. The name of the Subcontractor;

2. The dollar amount of the subcontract; and

3. The category of Work that the Subcontractor would be performing.

C. If no subcontracts subject to the above disclosure requirements are anticipated, a Bidder shall so indicate by entering "NONE" or by filling in the appropriate check box. For each Subcontractor listed, Bidders shall provide all requested information. An incomplete form will be cause for rejection of the Bid.

D. The Subcontractor Disclosure Form may be submitted for a paper Bid **(See 00120.05(b-1) either:**

1. **By filling out the Subcontractor Disclosure Form printed from the Bid Booklet on the Agency's Engineering Division's website, or;**

2. _____

E. Subcontractor Disclosure Forms will be considered late if not received by the Agency within 2 working hours after the time designated for receiving Bids.

F. The Agency is not responsible for partial, failed, illegible or partially legible facsimile (FAX) transmissions or submittals, and such forms may be rejected as incomplete.

G. In the event that multiple Subcontractor Disclosure Forms are submitted, the last version received prior to the deadline will be considered to be the intended version.

H. Bids not in compliance with the requirements of this Subsection will be considered non-responsive.

I. **Submit list of subcontractors on Document 00 45 50 First-Tier Subcontractor Disclosure Form, sealed in an opaque envelope, addressed and delivered to the same location as the Bid.**

1.18 SCHEDULE OF VALUES

A. Upon request by the Architect, the selected bidder shall within seven days thereafter, submit to the Architect a Schedule of Values of various parts of the work, including quantities and amount aggregating the total sum of the Contract. With each application for payment, the Contractor shall furnish a detailed statement comprising various items which represent the total amount of work completed to the date upon which application for payment is made. No application for payment will be considered unless accompanied by such a statement.

1.19 BID IRREGULARITY GUIDELINES

A. Guidelines for handling bid irregularities developed and agreed upon by the Oregon AIA-AGC Joint Cooperative Committee.

B. Substantial Bid Irregularities Requiring Rejection of Bid:

1. Bids not submitted on specified form, or altered in form by a bidder.

2. Unsigned bids.

3. Bids by non-prequalified entities where prequalification was specified.

4. Conditioning of a bid or bid items in a bid contrary to the specified requirements of bid items or Bid Documents.

5. Bids which have items omitted by the bidder. An exception: "NO BID" on an alternate should not disqualify a bid unless that alternate is pertinent in determining who will be low.

6. Post-bid monetary modification of bids due to provable mistakes of fact.

7. Post-bid refusal to submit to specified bidding requirements such as Wages, Non-Collusion, or Subcontractor Listing.

8. Altering a bid as to specified time of commencement or completion of work.

9. Bids not received prior to specified deadline.

10. List of first-tier subcontractors not received prior to specified deadline.

1.20 EQUAL EMPLOYMENT COMPLIANCE REQUIREMENT

A. By submitting this bid, the bidder certifies conformance with the applicable Federal Acts, Executive Orders, and Oregon Statutes and Regulations concerning Affirmative Action toward equal employment opportunities. All information and reports required by the Federal or Oregon governments having responsibility for the enforcement of such laws shall be supplied to the Owner upon request, for purposes of investigation to ascertain compliance with such acts, regulations, and orders.

1.21 WAGE ACTS

A. The provisions of ORS 279C.800 through 279C.870 are applicable to Work under this Contract. In accordance with ORS 279C.830, the minimum hourly rates of wage as determined by the Commissioner of the Bureau of Labor and Industry (BOLI) are hereby made a part of this Project Manual.

B. Wage acts that apply to this Project are available at: https://www.oregon.gov/boli/WHD/PWR/Pages/PWR-Rate-Publications---2018.aspx and listed as "Prevailing Wage Rates for Public Works in Oregon effective July 1, 2018" and "Prevailing Wage Rate Amendment effective October 1, 2018.".

END OF DOCUMENT

PRE-BID MEETING

PART 1 GENERAL

1.1 SCHEDULE AND ATTENDANCE

A. This pre-bid meeting is not mandatory.

B. Meeting Date: Thursday, December 20, 2018

C. Meeting Time: 10:00 am local time

D. Meeting Location: Woodburn City Hall, 270 Montgomery Street, Woodburn OR 97071, Council Chambers

E. Attendance: Owner, Architect, general contract bidders, and major sub-bidders.

1.2 ADMINISTRATION OF MEETING

A. Architect will make physical arrangements for and preside at pre-bid meeting.

B. Architect will record items discussed and decisions made at pre-bid meeting.

C. Architect will distribute copies of pre-bid meeting decisions to bidders in an addendum.

1.3 AGENDA

A. The following is the minimum agenda for the pre-bid meeting:

1. Review of alternates.
2. Review of unit prices.
3. Review of bid form requirements.
4. Review of first-tier subcontractor disclosure requirements.
5. Review of work by others.
6. Review of limits for staging and parking.
7. Review of restrictions on use of premises.
8. Review of insurance requirements.
9. Review of bonding requirements.
10. Review of construction schedule.
11. Questions from bidders.

END OF DOCUMENT

PRELIMINARY SCHEDULES

PART 1 GENERAL

1.1 CRITICAL DATES

A. Start construction work within seven days after receiving Notice to Proceed from the Owner, but not later than February 4, 2019.

B. Obtain Substantial Completion of the Project by June 24, 2019.

1.2 SCHEDULE INFORMATION IN CONTRACT DOCUMENTS

A. Liquidated Damages: Contracting Requirements Document "Supplementary Conditions."

B. Construction Schedule by Contractor: Division 1 Section "Construction Progress Documentation."

END OF DOCUMENT

BID FORM

TO: City of Woodburn Public Works

FROM: _____ (Name of Bidder)

1.1 BIDDER AGREEMENT

A. The Undersigned has:

1. Reviewed the Woodburn City Hall Remodel & HVAC Upgrade Project Manual and Drawings.

2. Reviewed Addenda Numbers _____ inclusive.

3. Examined the site and conditions affecting the Work.

B. The Undersigned agrees:

1. To hold this Bid open for 30 days subject to provisions in Bidding Requirements Document "Instructions to Bidders."

2. That Bid Security attached to this Bid Form is left in escrow with Owner as a Bid Guarantee, subject to provisions in Bidding Requirements Document "Instructions to Bidders."

3. That Bid Security is not less that ten percent (10%) of the Basic Bid amount, and is in the form of a (choose one):

a. Cashier's check [__]

b. Certified check [__]

c. Bid Bond [__]

4. That Bid Forms not indicating that Addenda were received prior to Bid Date may be rejected by the Owner.

5. That this Bid has been arrived at by the Bidder independently and has been submitted without collusion designed to limit independent bidding and competition.

6. That the Bidders Qualification Form shall be submitted within five days after Bid Opening.

C. If awarded a contract, the Undersigned agrees:

1. To enter into and execute a Contract on the basis of this Bid.

2. To deliver to the Owner a formal written Agreement subject to provisions in Bidding Requirements Document "Instructions to Bidders."

3. To commence the Work no later than seven days after the date of execution of the Contract or receipt of Notice to Proceed, whichever occurs first.

4. To complete the Work in accordance with the Contract Documents for the amount set forth in this Bid Form.

5. To complete the Work within the time period stipulated in Bidding Requirements Document "Preliminary Schedules."

6. To comply with Oregon Revised Statutes, ORS 279C.830 and pay workers not less than Prevailing Wage Rates as published by the Oregon Bureau of Labor and Industries.

7. That the Contract shall contain a provision that the contractor shall pay and perform according to the conditions required by ORS 279C.800 to 279C.870.

1.2 BID AMOUNTS

A. Basic Bid, Stipulated Sum: $_____
_____dollars.

B. Alternate Bids: The Basic Bid may be adjusted in accordance with Division 1 Section "Alternates," in the amounts indicated below:

1. Alternate 1: Deduct $_____

_____dollars.

2. Alternate 2: Deduct $_____

_____dollars

3. Alternate 3: Deduct $_____

_____ dollars

4. Alternate 4: Deduct $_____

_____dollars

C. Unit Price: Roof Sheathing Replacement $_____ per sq. ft.

_____dollars per square foot.

D. Number of days to complete construction: _____ days.

1.3 BIDDER'S SIGNATURE AND IDENTIFICATION

Please print or type all information requested below (except where signature is required) and attach Bid Security to this form.

BID FORM

Name of Proprietorship, Partnership, or Corporation	Signature of Proprietor, Partner, or Corporate Official
Street Address	Name of Signatory
Mailing Address	Date Signed
City, State, and Zip Code	If Corporation, Attest:
Phone Number	Secretary of Corporation
Employer ID Number	State of Incorporation
Construction Contractors Board Number	

END OF DOCUMENT

BIDDERS QUALIFICATION FORM

PART 1 GENERAL

1.1 SUMMARY

A. In an effort to determine the lowest "responsible bidder," the City of Woodburn Public Works has developed this questionnaire to provide information for bidder evaluation. The following rule has been adopted by the City of Woodburn Public Works. This rule may differ from that as adopted by other agencies and it is the responsibility of the bidder to read and understand any differences.

B. These rules shall take precedence over all other rules as applicable.

1.2 CONTRACTOR'S EQUIPMENT AND EXPERIENCE QUESTIONNAIRE

A. Introductory Statement:

1. In accordance with the statutes of the State of Oregon, every public contracting agency contemplating receiving bids for and awarding any contract for a public improvement may require any prospective bidder to submit a full and complete statement concerning his equipment and experience in constructing public improvements.

2. The application and questionnaire forms which are a part of this document herewith comply with the requirements of public contracting rules and will be used in determining the qualifications of prospective bidders. <u>This is not a prequalification document.</u>

3. The applicant should use care and integrity in preparing this information. The public contracting agency may make independent inquiries concerning the contractor's past performance and capabilities. This information will be used to determine the "lowest responsible bidder" as determined by ORS, OAR, Oregon AG Model Rules, and rules as additionally adopted by City of Woodburn Public Works.

B. Manner of Preparing and Filling In Forms:

1. This application shall include information about equipment and experience for only the specific single business organization or entity which is bidding and which would be the signatory on a contract with the City of Woodburn Public Works.

2. All answers and entries on the forms, except signatures, should be typewritten or printed legibly. Failure to supply adequate information could be grounds for rejection.

3. All answers and entries shall be specific and complete in detail.

4. The application shall be signed by the applicant. The signatory of the statement guarantees the truth and accuracy of all statements and of all answers to questions.

5. The City of Woodburn Public Works also states that it will use whatever other means is warranted to determine the complete qualifications of the bidder.

C. Use of Attachments: Schedules, reports and other forms may be used as attachments to the prescribed form, provided that the information contained therein specifically includes the information required by this form.

D. Time and Place of Submission: As directed by the City of Woodburn Public Works, this Bidders Qualification Form shall be submitted prior to the bid deadline.

E. Confidential Information: Information furnished will be treated as confidential information, but is subject to disclosure. Only Trade Secrets may be requested to be treated absolutely confidentially.

1.3 APPLICABLE RULES

A. The City of Woodburn Public Works has accepted Oregon Administrative Rules 125-30-003 and 125-30-004, as accepted by the State of Oregon on September 22, 1992, but has made extensive changes to the content.

B. It is the responsibility of the bidder to review the revised wording as it appears below and to understand its ramifications. The numbers of the Oregon Administrative Rules are listed here as reference only. The wording as it appears below is the wording as revised and approved by the City of Woodburn Public Works.

1.4 OAR 125-30-003-HRCSD

RESPONSIBLE BIDDERS, RESPONSIBILITY INVESTIGATION

A. A responsible bidder is one who:

1. Has adequate financial resources to perform the contract, or the ability to obtain such resources. Except to the extent that the bidder has sufficient resources or proposes to perform the contract by subcontracting, the City of Woodburn Public Works shall require acceptable evidence of the bidder's ability to obtain required resources. Acceptable evidence normally consists of a performance bond from an acceptable surety in an amount equal to the bid price. Notwithstanding a performance bond, the City of Woodburn Public Works may determine the financial resources of the contractor so that the contractor will have the necessary finances to avoid nonperformance and resort to a claim on a bond. Such evidence may also include a commitment or specific arrangement that will be in existence at the time of contract award to rent, purchase, or otherwise acquire the needed facilities, equipment or other resources.

2. Has the ability to comply with the required or proposed delivery or performance schedule, taking into consideration all existing commercial and public commitments.

3. Has a satisfactory performance record. A bidder who is or has been deficient in contract performance within the last seven calendar years shall be presumed to be non-responsible unless the City of Woodburn Public Works determines that the circumstances were properly beyond the contractor's control or that the contractor has taken appropriate corrective action. Record of failure to perform previous contracts may be considered as evidence of non-responsibility. The City of Woodburn Public Works shall consider the number of contracts involved and the extent of the deficiency of each in making this evaluation.

4. Has key personnel available of sufficient experience to perform the contract, as well as adequate and qualified permanent, full-time personnel that may be required.

5. Has the necessary organization, experience, accounting and operational controls, and technical skills, or the ability to obtain these skills and abilities as required to satisfactorily perform the contract. These may include, as appropriate, such elements as production control procedures, property control systems, and quality assurance measures applicable to materials to be produced or services to be performed by the bidder and its proposed subcontractor(s).

6. Has the necessary production, construction, and technical equipment and facilities, or the ability to obtain them.

7. Is otherwise qualified and eligible to receive award under applicable laws and regulations.

B. The City of Woodburn Public Works has the right, prior to awarding any public contract, to make such investigation as is necessary to determine whether a bidder is responsible, as defined in this rule. This investigation may include an inquiry into the responsibility of the bidder's proposed subcontractors and suppliers. If a bidder fails to promptly supply, or have supplied, information requested by the City of Woodburn Public Works during its responsibility investigation, such failure shall be grounds for a funding non-responsibility.

C. A responsible proposer is one who has the attributes, qualities, or capabilities of a responsible bidder as set forth in (1)(a) through (g) of this rule. The City of Woodburn Public Works has the right, as set forth in (2) of this rule to make such investigations as necessary to determine whether a proposer is responsible.

1.5 OAR 125-30-004-HRCSD

RESPONSIVE AND NON-RESPONSIVE BID OR PROPOSAL ACCEPTANCE AND REJECTION

A. A "responsive bid or proposal" is one which complies in all material aspects with an Invitation to Bid or Request for Proposals (hereinafter referred to as ITB and RFP, respectively) and with all prescribed public bidding procedures and requirements.

B. A "non-responsive bid or proposal" is, except in the case of minor informalities as provided in OAR 137-30-075(2), one which:

1. Omits or is unclear as to the price.

2. Offers goods or services of a quality or quantity different from that requested in the ITB or RFP

3. Requires a delivery date different from that required in the ITB or RFP.

4. Takes exception to the Terms and Conditions of the ITB or RFP.

5. Is conditional upon the Public Contracting Agencies acceptance of Terms and Conditions different from those contained in the ITB or RFP.

6. Contains a deviation which, if the bid or proposal were accepted, would give the bidder or proposer a substantial advantage or benefit not shared by other bidders or proposers to the ITB or RFP.

C. The City of Woodburn Public Works District shall accept, and consider for award, only those bids or proposals which are responsive as defined in this rule. Non-responsive bids or proposals shall be rejected as provided in OAR 137-30-100.

1.6 CONTRACTOR'S INFORMATION, EQUIPMENT AND EXPERIENCE

QUESTIONNAIRE

A. Bidder:

Name: _____
Address: _____
Address: _____
Phone: _____
Fax: _____

B. Date Submitted: _____

C. Bidder is a/an: _____ Individual

_____ Partnership
_____ Corporation
_____ Joint Venture
_____ Member of Joint Venture

D. If a Joint Venture, Name of Other Joint Venture Participants:

_____
_____
_____
_____

E. Project: _____

F. Signed: _____

G. Experience: Enter the dollar amount and number of years of experience as contractor performing the work or contractor subcontracting the work in each class of work (use additional sheets if necessary):

	Maximum Dollar Amount Total of all Contracts	Years of Experience
Concrete	$_____	_____

BIDDERS QUALIFICATION FORM

Masonry	$_____	_____
Steel	$_____	_____
Electrical	$_____	_____
Low Voltage Electrical	$_____	_____
Building Construction	$_____	_____
Alteration and Remodeling	$_____	_____
Painting	$_____	_____
Plumbing	$_____	_____
HVAC	$_____	_____
Roofing and Insulation	$_____	_____
Sheet Metal	$_____	_____
Carpet and Floor Coverings	$_____	_____
Cabinet Work	$_____	_____
Other		

Key Personnel	Title	Years of Experience
_____	_____	_____
_____	_____	_____
_____	_____	_____

Major Equipment Owned	Estimated Book Value
_____	$_____
_____	$_____
_____	$_____

References of Similar Projects	Amount Bid	Date Completed	Phone Number
_____	$_____	_____	_____
_____	$_____	_____	_____

END OF DOCUMENT

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

PROJECT NAME: WOODBURN CITY HALL REMODEL & HVAC UPGRADE

BID CLOSING DATE: Thursday, January 17, 2019 TIME: 2:00 pm local time

DISCLOSURE DEADLINE DATE: Thursday, January 17, 2019 TIME: 4:00 pm local time

This form must be submitted in a separate envelope within two (2) business hours of the advertised bid closing date and then no later than the DISCLOSURE DEADLINE stated above.

List below the Name, Dollar Value, Category of each subcontractor that will be furnishing labor or materials that are required to be disclosed. Enter "NONE" if there are no subcontractors that need to be disclosed. (If needed, attach additional sheets.)

NAME	DOLLAR VALUE	CATEGORY
1.	$	
2.	$	
3.	$	
4.	$	
5.	$	
6.	$	
7.	$	
8.	$	
9.	$	

Without regard to the amount of a Bidder's Bid, if the Agency's cost range for a public improvement Project in the "Invitation to Bid", or in other advertisement or solicitation documents, exceeds $100,000, the Bidder shall, within 2 working hours of the time Bids are due to be submitted, submit to the Agency, on a form provided by the Agency, a disclosure identifying any first-tier Subcontractors that will furnish labor or labor and Materials, and whose contract value is equal to or greater than:
The above listed first-tier subcontractor(s) are providing labor or materials with a Dollar Value equal to or greater than:

a) 5% of the total Contract Price, but at least $15,000 (add all additive alternates and subtract all deductive alternates).

b) $350,000 regardless of the percentage of the total Contract Price.

FAILURE TO SUBMIT THIS FORM BY THE DISCLOSURE DEADLINE WILL RESULT IN A BID SUBMITTAL BECOMING NON-RESPONSIVE, AND SUCH BIDS SHALL NOT BE CONSIDERED FOR AWARD.

Form Submitted By (Bidder Company Name): _____

Contact Name: _____ Phone No.: (____) _____

DELIVER FORM TO: Eric Liljequist, Public Works Director, City of Woodburn Public Works.

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

DOCUMENT SHALL NOT BE FAXED. It is the responsibility of bidders to separately submit this disclosure form and additional sheets, with the words "DISCLOSURE FORM", the Project Name clearly marked on the envelope, at location indicated above by the specified deadline.

END OF DOCUMENT

AGREEMENT FORM

PART 1 GENERAL

1.1 SUMMARY

A. The Agreement between the Owner and the Contractor for the Work of this Project will be executed on AIA Document A101 - Stipulated Sum and is hereby incorporated as part of the Contract Documents.

B. An example of the Agreement may be examined at the Architect's Office, and copies can be ordered from:

1. Portland Chapter AIA; 403 NW 11th Ave; Portland, OR 97209; (503) 223-8757

2. American Institute of Architects; Box 60; Williston, VT 05495; (800) 365-2724

C. Additionally, Document can be ordered from American Institute of Architects at:

1. http://documentsondemand.aia.org/

END OF DOCUMENT

BONDS

PART 1 GENERAL

1.1 SUMMARY

A. The Performance Bond and Payment Bond, AIA Document A312, is hereby incorporated into the Contract Documents.

B. An example of the Performance Bond and Payment Bond may be examined at the Architect's Office, and copies can be ordered from:

1. Portland Chapter AIA; 403 NW 11th Ave; Portland, OR 97209; (503) 223-8757

2. American Institute of Architects; Box 60; Williston, VT 05495; (800) 365-2724

C. Additionally, Document can be ordered from American Institute of Architects at:

1. http://documentsondemand.aia.org/

END OF DOCUMENT

GENERAL CONDITIONS

PART 1 GENERAL

1.1 SUMMARY

A. The General Conditions of the Contract are the American Institute of Architects' AIA Document A201, "General Conditions of the Contract for Construction," 2007 Edition, Articles 1 through 15 inclusive, which is hereby incorporated as part of the Contract Documents.

B. An example of the General Conditions of the Contract may be examined at the Architect's Office, and copies can be ordered from:

1. Portland Chapter AIA; 403 NW 11th Ave; Portland, OR 97209; (503) 223-8757

2. American Institute of Architects; Box 60; Williston, VT 05495; (800) 365-2724

C. Additionally, Document can be ordered from American Institute of Architects at:

1. http://documentsondemand.aia.org/

END OF DOCUMENT

SUPPLEMENTARY CONDITIONS

Supplementary Conditions consists of changes and additions to the AIA Document A201-2007 "General Conditions of the Contract for Construction." Where any part of the General Conditions is modified or voided by the Supplementary Conditions, the unaltered provisions shall remain in effect. The Supplementary Conditions and technical Sections of the Specifications take precedence where in conflict with the General Conditions. The numbering system utilized below corresponds to identically numbered provisions of the General Conditions.

1.1 BASIC DEFINITIONS

1.1.1.1 Add Paragraph: "Only the hard copy (paper) format of the Contract Documents shall be binding."

1.1.1.2 Add Paragraph: "Use of Contract Documents in electronic media format will be permitted upon receipt of signed and dated "Agreement Between Contractor and Architect Concerning Use of Electronic Media" (form included herein).

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1 Replace Paragraph with: "The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results."

1.2.1.1 Add Paragraph: "Reference in the Specifications to an article, device, or piece of equipment in the singular number shall apply to as many such articles as are shown on Drawings or required to complete the installation. Mention in the Specifications or indication on the Drawings of articles, products, materials, operations, or methods requires the Contractor to provide and install such items including all necessary plant, labor and appurtenances. Titles and headings are a part of the Specifications, the same as the text of the article or paragraph. Notes on Drawings are considered Specifications, equal in force to those in the printed text."

1.2.1.2 Add Paragraph: "When several materials are specified, or approved, for one use, select for use any of those so specified. For specified materials and brands, no substitutions are permitted other than as approved before the bid opening, in accordance with Instructions to Bidders."

1.2.1.3 Add Paragraph: "In the event of a conflict or inconsistency in or among the Contract Documents, or between the Contract Documents and applicable codes in effect at the time the Contract Sum is bid or negotiated, the Contractor shall, unless directed otherwise in writing by the Architect, provide the greatest quantity, highest quality, highest degree of safety, and most stringent material, equipment or Work."

1.2.4 Add Paragraph: "Sections of Division 1 - General Requirements govern the execution of all Sections of the Specifications."

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.5 Replace Paragraph with: "Contractor will be furnished ten sets of Drawings and Project Manuals after award of the Contract. Additional copies will be furnished upon request at their cost of reproduction, if additional sets are not readily available."

2.3 OWNER'S RIGHT TO STOP THE WORK

2.3.2 Add Paragraph: "The Owner's exercise of its right to stop Work pursuant to Subparagraph 2.3.1 shall not relieve the Contractor from any of its responsibilities and obligations under the Contract Documents."

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

2.4.1 In the second sentence add: "and expenses" after "Architect's additional services."

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.2 Revise the second sentence to read: “These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor, or in the exercise of ordinary care, reasonably should have recognized, such error, inconsistency, omission, or difference as a request for information in such form as the Architect may require.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 Replace Paragraph with: "The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract."

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

3.4 LABOR AND MATERIALS

3.4.2 Replace Paragraph with: "Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions of material and labor only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. By making requests for substitutions, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product, and determined that it is equal or superior in all respects to that specified;
.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for the product specified;
.3 certifies that the cost data presented is complete and includes all related costs under this Contract and waives all claims for additional costs related to the substitution which subsequently become apparent;
.4 will be responsible for any redesign costs caused by the substitution;
.5 will coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects;
.6 will install all materials in accordance with applicable manufacturer's recommendations; and
.7 will be responsible for all other costs attributable to the substitution."

3.4.4 Add Paragraph: "The Contractor shall conform to Federal, State, and local legal requirements pertaining to the employment labor and labor conditions on the job. All employees shall be skilled in their respective trades, and shall do work of a standard and quality equal or higher than as specified. Employees whose work does not meet or exceed specified minimum standards, or whose conduct interferes with the Work, shall be immediately dismissed or reassigned to appropriate work upon notice from the Architect. The Contractor shall protect and defend the Owner from any damage or claim arising out of any labor dispute involved in the execution of this Contract."

3.5 WARRANTY

3.5.1 Add Paragraph: "The Contractor, his subcontractors, sub-subcontractors, material suppliers, and equipment suppliers, shall be jointly and severally responsible for the terms of the warranty specified in Paragraph 3.5."

3.7 PERMITS, FEES AND NOTICES

3.7.1 Replace Paragraph with: "Prior to commencing any work requiring a permit or similar authorization, the Contractor shall secure and pay for all necessary licenses, fees, inspections, utility connection fees, building permits, and other permits, and similar authorization required by the contract and other legal obligations required of the Contractor. All building permits' fees, utility connection fees, and inspection fees shall be paid for by the Contractor and reimbursed by the Owner upon request. The amount to be reimbursed shall be limited to the actual fee charged, and copies of each invoice shall be submitted to the Owner. The Contractor shall advise the Owner concerning notices required by all applicable federal, state, and local laws, ordinances, rules, regulations, and restrictions. All temporary connection fees, subcontractor permits, and all other fees are included in the Contract, and shall be paid for by the Contractor and shall not be reimbursed by the Owner. Deliver all permits and certificates to Architect at completion of the work. Architect will submit Drawings and Specifications, with the exception of deferred submittals, for a plans review to assist the Contractor in obtaining a building permit. The Owner has paid all plan check fees."

3.7.3 Replace Paragraph with: "If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, the Contractor shall assume responsibility for correction of such Work and shall bear the costs, losses and expenses attributable to correction."

3.9 SUPERINTENDENT

3.9.1 Replace Paragraph with: "The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall be satisfactory to the Owner. So long as the superintendent remains employed by the Contractor or any related entity, the superintendent shall not be replaced without the Owner's prior written consent. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor."

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULE

3.10.4 Add Paragraph: "Paragraphs 3.10.1, 3.10.2 and 3.10.3 notwithstanding, the Owner receives no benefit from the Project being substantially complete prior to the date of required Substantial Completion as set forth in these documents. Therefore, construction schedules submitted by the Contractor that schedule Substantial Completion prior to the date of required Substantial Completion shall be rendered invalid, regardless of the Contractor's intent to complete the Project before required Substantial Completion."

3.10.5 Add Paragraph: "In the event the Owner determines that the performance of the Work has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation (1) working additional shifts or overtime, (2) supplying additional manpower, equipment and facilities, and (3) other similar measures (hereinafter referred to collectively as "Extraordinary Measures") which shall continue until the progress of Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the Construction Schedule."

3.10.6 Add Paragraph: "The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Paragraph 3.10."

3.10.7 Add Paragraph: "The Owner may exercise the rights provided to the Owner under or pursuant to this paragraph 3.10 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with the Completion Date set forth in the Contract Documents."

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 Add Paragraph: "Addenda, Change Orders, and other modifications shall be duly noted in the appropriate referenced location of the Project Manual and Construction Drawings for ease of reference during Construction."

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.4 Add Subparagraphs:

."1 It is the Contractor's responsibility to review and approve required shop drawings, and to inform the Owner and Architect in writing of any deviations. Although the Owner or Architect may take no exception to a shop drawing that contains a deviation, the deviation is not authorized unless identified in writing by the Owner or Architect and proper procedures are implemented for formal change.

.2 In no instance shall a shop drawing be construed as a contract, as a change order, or as an authorization to deviate from the contract requirements. A shop drawing is a construction means and methods document for use by the Contractor which does not change its status when submitted to the Owner and Architect."

3.12.11 Add Paragraph: "Electronic Media:

For the limited purpose of assisting the Contractor, Subcontractors and suppliers in the preparation of their Shop Drawings, the Architect will provide architectural plans and elevations on electronic media (which were the basis for the drawings used in bidding) to the Owner for use by the Contractor upon receipt of signed "Agreement Between Contractor and Architect Concerning Use of Electronic Media" form included at the end of this Document.

7.2 CHANGE ORDERS

7.2.2 Add Paragraph: "Methods used in determining adjustments to the Contract Sum shall include those listed in Subparagraph 7.3.3."

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.7 Add to the end of the first sentence: "as set forth in Paragraph 7.3.11."

7.3.11 Add Paragraph: "For any adjustments to the Contract Sum that are based on other than the unit prices method, the Contractor agrees to charge, and accept, as payment for overhead and profit, the following percentages of costs attributable to the change in the Work:

.1 Ten percent (10%) for Work by the Contractor not involving Subcontractors;
.2 Five percent (5%) for Work by Subcontractors, calculated without subcontractor profit;
.3 When both additions and credits are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any;
.4 For additional Work ordered as described above that will be executed by Subcontractors, it is agreed that the Subcontractors will be permitted to charge ten percent (10%) for work not involving Sub-subcontractors and five percent (5%) for Work by Sub-subcontractors, calculated without Sub-subcontractor profit."

7.5 INSPECTION AND AUDIT OF RECORDS RELATING TO CHANGES
Add new paragraph 7.5 and the following subparagraphs:

7.5.1 Add Paragraph: "The Owner shall have the right to inspect and to audit the Contractor's records, books, correspondence, instructions, receipts, vouchers, memoranda and other data relating to Change Orders and Construction Change Directives at any time during the Work and within three (3) years after Final Completion of the Work."

7.5.2 Add Paragraph: "If an audit conducted by the Owner pursuant to Subparagraph 7.5.1 determines that the Contractor has requested or has been paid more than one hundred percent (100%) of the actual cost to the Contractor pursuant to Change Orders and Construction Change Directives, the Contractor shall pay the Owner's costs of the audit and return all amounts in excess of one hundred percent (100%) to Owner."

8.2 PROGRESS AND COMPLETION

8.2.2 Replace the first sentence of Paragraph with: "The Contractor shall not, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner."

8.3 DELAYS AND EXTENSION OF TIME

8.3.3 Add to Paragraph: "The Owner shall not be liable for claims for damages or extra costs due to delay of the Contractor's work which is not caused by the Owner and all costs for work delay incurred by the Contractor shall be paid by the Contractor. Float time created by the Contractor obtaining Substantial Completion before the Project deadline belongs to the Project."

8.3.4 Add new Paragraph: "The Owner shall have no liability or other duty or obligation to compensate the Contractor or any other person for any loss of efficiency, morale, or attitude; fatigue; labor rhythm; constructive acceleration; home office overhead; under-run in the production of goods; trade stacking; reassignment of workers; concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple effect; season change; extended overhead; profit or mark-up on delay damage; or other impact or similar damages that may be a direct or indirect consequence of, or otherwise attributable to, or caused by delay."

8.3.5 Add new Paragraph:
Contractor is responsible for reasonable verification of existing conditions well in advance of commencement of applicable portion of work to allow time for adjustments to be made if necessary where conditions are not as shown in contract documents. Extension of contract time will not be granted where Contractor has not performed due diligence in verification.

8.3.6 Add new Paragraph:
Contractor is responsible for reasonable verification of feasibility of performance of construction as shown in the Contract Documents well in advance of commencement of applicable portion of work to allow time for adjustments to be made if necessary where construction as documented is not feasible. Extension of contract time will not be granted where Contractor has not performed due diligence in verification.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 Add to Paragraph: "Make monthly application for payment in writing on forms approved by Architect. Base progress payments on both the estimated value of work satisfactorily installed and material accepted and suitably stored on the site up to midnight of the last day of the monthly billing period."

9.3.1.2 Add to Paragraph: "Such applications may not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier for their portion of Work completed."

9.6 PROGRESS PAYMENTS

9.6.1 Replace Paragraph with: "After the Architect has issued a Certificate for Payment, the Owner shall make monthly payments on the day of the month as established by the Owner. Except as noted hereafter, the Owner shall retain 5% (five percent) of the certified contract payments due until Final Acceptance of the Work. As work progresses, the Owner may reduce the amount of the retainage and may eliminate retainage on any remaining monthly contract payments after 50% (fifty percent) of the work under the contract is completed if, in the Owner's opinion, such work is progressing satisfactorily. Any reduction or elimination of retainage from progress payments shall be allowed only upon written application by the Contractor, which shall include written approval of the Contractor's surety.

.1 Upon Substantial Completion of the work and the written acceptance thereof by the Owner, a portion of the retainage may be released to the Contractor if, in the Architect's opinion, the Contractor's performance is satisfactory and such release is in the Owner's interests. In no case will retainage be less than two hundred percent (200%) of the estimated value of uncompleted work and work requiring corrections.

.2 The Contractor shall notify the Owner in writing when he considers the work complete and the Owner shall, within fifteen days after receiving written notice, either accept the work or notify the Contractor of work yet to be performed on the Contract.

.3 When all items on the punch list have been completed satisfactorily, the final payment shall be made to the Contractor, including the balance of the retainage. If final payment is delayed, the Owner shall pay to the Contractor, interest at the rate per month as set forth in ORS 279C.570 on the final payment amount due.

.4 Interest to commence and terminate as set forth in ORS 279C.570.

.5 In accordance with the provisions of ORS 279C.560, the Owner shall reduce the amount of the retainage if the Contractor notifies the Owner that the Contractor has deposited in a bank or trust company, in a manner agreed upon by the Owner, bonds and securities of equal value.

.6 As another alternate for handling retainage in accordance with the provisions of ORS 279C.560, and in a manner agreed upon by the Owner, upon the written request of the Contractor, the Owner shall deposit any amounts withheld as retainage in an interest-bearing account in a bank, trust company or savings association for the benefit of the Owner. Interest earned on such account shall accrue to the Contractor.

.7 If the Owner incurs additional costs as a result of the exercise of either of the last two options for retainage described above, the Owner may recover such costs from the Contractor by a reduction of the final payment. As work on the contract progresses, the Owner shall, upon demand, inform the Contractor of all accrued costs."

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 Revise the sixth phrase of Paragraph to read: "…and on the basis of the Architect's on-site visits and observations,"…

9.11 LIQUIDATED DAMAGES

Add paragraph “9.11 Liquidated Damages” and its sub-paragraphs to Article 9:

9.1.1 The Woodburn City Hall Remodel & HVAC Upgrade project shall be Substantially Complete as defined in Paragraph 8.1.3 in Contracting Requirements Document "General Conditions," not later than 5 p.m. local time, Monday, June 24, 2019.

9.1.2 Failure to complete the project by the Substantial Completion date shall entitle the Owner to deduct and retain from amounts otherwise due the Contractor from retainage, a sum computed at the rate of $200.00 per day for every calendar day thereafter until Substantial Completion of the Contract.

9.1.3 The amount of liquidated damages fixed above is a reasonable forecast of just compensation for the Owner for damage caused by failure of Contractor to substantially

complete the Woodburn City Hall Remodel & HVAC Upgrade project by the Substantial Completion date indicated above.

9.1.4 The amount of damages to the Owner caused by failure of the Contractor to meet the Substantial Completion requirement is difficult to estimate. Loss to the Owner includes loss of business income, overtime labor expenses for the Owner's employees and vendors installing Owner-furnished equipment and furnishings and may include extra travel and housing expenses as well as tool and construction equipment rental expenses.

10.3 HAZARDOUS MATERIALS

10.3.3.1 Add Subparagraph: "Contractor shall not cause or permit any "Hazardous Materials" (as defined herein) to be brought upon, kept or used in or on the job site except to the extent such Hazardous Materials are necessary for the execution of the Work or are required pursuant to the Contract Documents. Removal of such Hazardous Materials shall be undertaken within twenty-four (24) hours following Owner's demand for such removal. Such removal shall be undertaken by Contractor at its sole cost and expense, and shall be performed in accordance with all applicable laws. Any damage to the Work, the job site or any adjacent property resulting from the improper use, or any discharge or release of Hazardous Materials shall be remedied by Contractor at its sole cost and expense, and in compliance with all applicable laws. Contractor shall immediately notify Owner of any release or discharge of any Hazardous Materials on the job site. Contractor shall be responsible for making any and all disclosures required under applicable "Community Right-to-Know" laws. Contractor shall not clean or service any tools, equipment, vehicles, materials or other items in such a manner as to cause a violation of any laws or regulations relating to Hazardous Materials. All residue and waste materials resulting from any such cleaning or servicing shall be collected and moved from the job site in accordance with all applicable laws and regulations. Contractor shall immediately notify Owner of any citations, orders or warnings issued to or received by Contractor, or of which Contractor otherwise becomes aware, which relate to any Hazardous Materials on the job site. Without limiting any other indemnification provisions pursuant to law or specified in the Contract, Contractor shall indemnify, defend (at Contractor's sole cost, with legal counsel approved by Owner) and hold Owner harmless from and against any and all such claims, demands, losses, damages, disbursements, liabilities, obligations, fines, penalties, costs and expenses in removing or remediating the effect of any Hazardous Materials on, under, from or about the job site, arising out of or relating to, directly or indirectly, Contractor's failure to comply with any of the requirements of this Subparagraph 10.3.3.1. As used herein, the term "Hazardous Materials" means any hazardous or toxic substances, materials and wastes listed in the United States Department of Transportation Hazardous Materials Table (49 CFR 172.101) or listed by the Environmental Protection Agency as hazardous substances (40 CFR Part 302) and any amendments thereto, and any substances, materials or wastes that are or become regulated under federal, state or local law. Hazardous Materials (or substances) shall also include, but not be limited to: regulated substances, petroleum products, pollutants, and any and all other environmental contamination as defined by, and in any and all federal, state and/or local laws, rules, regulations, ordinances or statues now existing or hereinafter enacted relating to air, soil, water, environmental or health and safety conditions."

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 Add to Paragraph: "Liability insurance must be on an Occurrence Basis and must include Direct Damage and Consequential Loss coverage, and Broad Form Property Damage coverage. Include personal injury liability coverage for false arrest, detention and imprisonment; malicious prosecution;

libel, slander, defamation of character; invasion of privacy, and wrongful eviction or wrongful entry."

11.1.2 Add to Paragraph: "Required Insurance Limits:

General Liability Operations -	
Bodily Injury	$1,000,000 / $2,000,000
Broad Form Property Damage	$1,000,000/ $2,000,000
Automobile -	
Bodily Injury	$1,000,000 / $1,000,000
Property Damage	$1,000,000"

11.1.2 Add to Paragraph: "File certificates in duplicate of all insurance requirements with the Architect. Make original policies available for inspection upon Architect's request."

11.1.2.1 Add Paragraph: "The City of Woodburn, Oregon and its officers, agents, representatives, volunteers, employees and the Architect shall be named as Additional Insureds under the Comprehensive General and Automobile Liability insurance policies. The policies shall stipulate that all such insurance shall apply as primary insurance and that any insurance carried by the Owner or any other Additional Insureds hereunder will be excess only and will not contribute with insurance provided by the Contractor. The Contractor shall also obtain cross-liability or severability of interests endorsements to such policies."

11.3 PROPERTY INSURANCE

11.3.1 Add to Paragraph: "Contractor's, subcontractors', and sub-subcontractors' interests in property insurance policies shall be in accordance with the following definition of the "Named Insured, City of Woodburn Public Works, Contractor, all subcontractors, and all sub-subcontractors as their interests may appear. It is also agreed that any losses covered by this policy will be adjusted with City of Woodburn Public Works and Contractor. It shall be the Contractor's and all subcontractors' responsibility to insure against loss all tools and equipment, whether owned, leased, or rented, used in the performance of this construction project."

12.2 CORRECTION OF WORK

12.2.2.1 Add to Paragraph: "The Contractor shall co-sign with the roofing subcontractor a two year roofing and sheet metal guarantee that all roof surfaces exposed to the weather are watertight and free from defective materials and workmanship."

13.5 TESTS AND INSPECTIONS

13.5.1 Replace Paragraph with: "Tests, inspections, and approvals of portions of the Work required by the Contract Documents or bylaws, ordinances, rules, regulations, or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such test, inspections, and approvals with an independent testing laboratory or entity selected by the Owner, or by the appropriate public authority. The Owner shall pay all costs for the independent testing laboratory except as otherwise provided herein. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so the Architect may observe such procedures."

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.3 Replace Paragraph: "In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed in accordance with the Contract Documents and costs incurred by reason of such termination, along with reasonable overhead and profit thereon, provided, this payment shall not include any overhead or profit for Work not executed."

14.4.4 Add Paragraph: "Upon determination of a court of competent jurisdiction that termination of the Contractor pursuant to Section 14.2 was wrongful, such termination will be deemed converted to a termination for convenience under Section 14.4, and Contractor's remedy for wrongful termination shall be limited to recovery of the payments permitted for termination by convenience as set forth in Section 14.4."

15.1 CLAIMS

15.1.4.1 Add Paragraph: "The Contractor shall reimburse the Owner for additional costs incurred by the Architect for the following causes:

.1 More than two (2) reviews of each Shop Drawing, Product Data item, sample and similar submittal of the Contractor.

.2 More than two (2) inspections for any portion of the Work to determine whether such portion of the Work is substantially complete in accordance with the requirements of the Contract Documents.

.3 More than two (2) inspections for any portion of the Work to determine final completion.

.4 Review of a Contractor's submittal out of sequence from the submittal schedule agreed to by the Architect and Contractor.

.5 Responses to the Contractor's requests for information where such information is available to the Contractor from a careful study and comparison of the Contract Documents, or Contractor-prepared coordination drawings.

.6 Evaluation of substitutions proposed by the Contractor during construction and making subsequent revisions to Instruments of Service resulting therefrom."

15.1.5.2 Replace entire Subparagraph: "If the Contractor wishes to make Claim for an extension in the Contract Time, written notice as provided herein shall be given to the Owner immediately or in no event later than twenty-one (21) days after the Contractor knows or should have known the basis for need for the extension of time, and a schedule analysis based upon the approved Contractor's Construction Schedule, showing the impact of the cause or event on the critical path of the approved Contractor's Schedule. Such notice shall include detailed documentation of the cause or event resulting in the Claim. No claim under the Subparagraph shall be valid unless so made. In the case of a continuing delay only one Claim is necessary."

15.1.5.3 Add Paragraph: "In order for the Architect to consider a time extension under subparagraph 15.1.5.2, the following conditions must be satisfied:

.1 The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the normal adverse weather days anticipated for the project location during any given month as published by the National Oceanic and Atmospheric Administration.

.2 The unusually severe weather must actually cause a delay to the completion of the project. The Contractor's original schedule and completion date must reflect these anticipated adverse weather delays in all weather dependent activities."

15.1.6 Replace entire Subparagraph: "Waiver of Claims**.** The Contractor waives Claims against the Owner for principal office expenses including the compensation of personnel stationed there, except those directly assigned to the Project to the extent of such assignment."

15.4.3 Add Paragraph: "Attorney Fees: If suit or action is instituted to enforce compliance with any of the terms, covenants or conditions of this contract, the prevailing party is entitled to recover, in addition to costs and disbursements provided by statute, such additional sum as attorney's fees, including attorney's fees upon appeal, as the court may adjudge reasonable."

END OF DOCUMENT

AGREEMENT BETWEEN CONTRACTOR AND ARCHITECT CONCERNING USE OF ELECTRONIC MEDIA

1. Contractor has requested that Architect provide to it certain plans, specifications and other documents in electronic media or CAD form ("FILES") for _____ _____("PROJECT"). Contractor has requested that Architect furnish FILES in order for Contractor, its subcontractors, and other consultants to expedite their work. Contractor acknowledges and agrees that the FILES are not intended to be used for construction; may not include all known or contemplated revisions at the time of transfer; are not Contract Documents under the terms of the Construction Contract; may be inaccurate as a result of electronic storage, transmission, technology compatibility or related issues; and may be revised by others without the knowledge or consent of the Architect or, when plotted, may result in variances or corrupt files of the Contractor.

2. Architect is nevertheless willing to provide the FILES on the terms and conditions specified herein.

3. Contractor agrees neither this Agreement nor the transfer of the FILES in any way restricts Architect's use of the FILES. Contractor agrees not to use the FILES for any purpose prohibited herein or project other than the Project for which it was prepared. The Contractor agrees to cease all use of the FILES by it and its subcontractors and consultants and return or destroy all such FILES in its possession or control upon written direction of Architect.

4. Contractor acknowledges that the FILES are the property of the Architect and subject to the copyright of the Architect. The electronic media disks may be write-protected by Architect such that no data on such disk can be manipulated. Architect will provide to the Contractor only a working copy electronic media disk. Said working copy disk shall have all indices of the Architect's Ownership, professional name, and/or involvement in the PROJECT removed from the electronic display. Any use of any kind and/or changes to the FILES, including by Contractor, its subcontractors, and consultants, will be at the Contractor's sole risk, and without liability, risk or legal expense to the Architect. The Contractor and any other person or entity using the FILES agrees to release and, to the fullest extent permitted by law, defend, indemnify, and hold harmless the Architect and its consultants and their partners, shareholders, agents and employees from and against any and all claims, demands, losses, expenses, damages, penalties and liabilities of any kind including without limitation, attorneys' fees arising out of or relating in any way to any such use of or change to the FILES or breach of this Agreement.

5. Under no circumstance shall the transfer of the FILES for use of the Contractor be deemed a sale by the Architect, and the Architect makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose.

6. Contractor agrees, as a condition of forwarding the FILES to its subcontractors or any other consultant, person or entity, to obtain the prior written approval of Architect for each recipient and to require such third party to agree in writing to the terms and conditions of this Architect's Agreement Concerning Use of Electronic Media and provide evidence of such agreement to the Architect before forwarding the FILES.

7. Nothing with respect to this Agreement or the transfer of the FILES is intended to or does create a right of Contractor or its subcontractors or consultants to rely upon the FILES or implies review or approval of the FILES by the Architect. Contractor, its subcontractors and consultants are not third party beneficiaries of Architect's agreement with the Project Owner.

Read and accepted by:

ARCHITECT:	CONTRACTOR:
_____	_____
Signature	Signature
_____	_____
Print Name	Print Name
Dated: _____	Dated: _____

PREVAILING WAGE RATES

PART 1 GENERAL

1.1 SUMMARY

A. This project is subject to the prevailing rate requirements of ORS 279C.800 to 279C.870. The current wage rates applicable to this project are available on the internet at: https://www.oregon.gov/boli/WHD/PWR/Pages/PWR-Rate-Publications---2018.aspx and listed as " Prevailing Wage Rates for Public Works in Oregon effective July 1, 2018" and "Prevailing Wage Rate Amendment effective October 1, 2018."

1.2 MINIMUM WAGE AND OVERTIME RATES FOR PUBLIC WORKS PROJECTS

A. General - The Contractor is responsible for investigating local labor conditions. The Agency does not imply that labor can be obtained at the minimum hourly wage rates specified in State or federal wage rate publications, and no increase in the Contract Amount will be made if wage rates paid are more than those listed.

B. State Prevailing Wage Requirements - The Contractor shall comply with the prevailing wage provisions of ORS 279C.800 through ORS 279C.870.

1. Minimum Wage Rates - The Bureau of Labor and Industries (BOLI) determines and publishes the existing State prevailing wage rates in the publication "Prevailing Wage Rates for Public Works Contracts in Oregon". The Contractor shall pay workers not less than the specified minimum hourly wage rate according to ORS 279C.838 and ORS 279C.840 and shall include this requirement in all subcontracts.

2. Payroll and Certified Statements - As required in ORS 279C.845, the Contractor and every subcontractor shall submit written certified statements to the Architect on the form prescribed by the Commissioner of BOLI in OAR 839 025 0010 certifying compliance with wage payment requirements and accurately setting out the Contractor's or subcontractor's weekly payroll records for each worker employed upon the project.

3. The Contractor and subcontractors shall preserve the certified statements for a period of six years from the date of completion of the Contract.

C. Additional Retainage:

1. Agency - As required in ORS 279C.845(7) the Agency will retain 25% of any amount earned by the Contractor on the project until the Contractor has filed the certified statements required in ORS 279C.845 and in FHWA Form 1273, if applicable. The Agency will pay to the Contractor the amount retained within 21 days after the Contractor files the required certified statements, regardless of whether a subcontractor has failed to file certified statements.

2. Contractor - As required in ORS 279C.845(8) the Contractor shall retain 25% of any amount earned by a first tier subcontractor on the project until the first tier subcontractor has filed with the Agency the certified statements required in ORS 279C.845 and in FHWA Form 1273, if applicable. Before paying any amount retained, the Contractor shall verify that the first tier subcontractor has filed the certified statement. Within 21

days after the first tier subcontractor files the required certified statement the Contractor shall pay the first tier subcontractor any amount retained.

D. State Overtime Requirements - As a condition of the Contract, the Contractor shall comply with the pertinent provisions of ORS 279C.540.

1. Maximum Hours of Labor and Overtime Pay - According to ORS 279C.540, no person shall be employed to perform Work under this Contract for more than 10 hours in any one Day, or 40 hours in any one week, except in cases of necessity, emergency, or where public policy absolutely requires it. In such instances, the Contractor shall pay the employee at least time and a half pay:

   a. For all overtime in excess of eight hours a day or 40 hours in any one week when the work week is five consecutive days, Monday through Friday; or

   b. For all overtime in excess of 10 hours a day or 40 hours in any one week when the work week is four consecutive days, Monday through Friday; and

   c. For all Work performed on Saturday and on any legal holiday specified in ORS 279C.540.

   d. For additional information on requirements for overtime and establishing a work schedule see OAR 839 025 0050 and OAR 839 025 0034.

2. Notice of Hours of Labor - The Contractor shall give written notice to employees of the number of hours per day and days per week the employees may be required to work. Provide the notice either at the time of hire or before commencement of work on this Contract, or by posting a notice in a location frequented by employees.

3. Exception - The maximum hours of labor and overtime requirements under ORS 279C.540 will not apply to the Contractor's Work under this Contract if the Contractor is a party to a collective bargaining agreement in effect with any labor organization. For a collective bargaining agreement to be in effect it shall be enforceable within the geographic area of the project, and its terms shall extend to workers who are working on the project (see OAR 839 025 0054).

4. State Time Limitation on Claim for Overtime - According to ORS 279C.545, any worker employed by the Contractor is foreclosed from the right to collect any overtime provided in ORS 279C.540 unless a claim for payment is filed with the Contractor within 90 days from the completion of the contract, provided the Contractor posted and maintained a circular as specified in this provision. Accordingly, the Contractor shall:

   a. Cause a circular, clearly printed in boldfaced 12 point type containing a copy of ORS 279C.545, to be posted in a prominent place alongside the door of the timekeeper's office or in a similar place which is readily available and freely visible to any or all workers employed to perform Work; and

   b. Maintain such circular continuously posted from the inception to the completion of the Contract on which workers are or have been employed.

PREVAILING WAGE RATES

END OF DOCUMENT

SUMMARY

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Description:

1. The Woodburn City Hall Remodel & HVAC Upgrade Project consists of remodeling the existing city hall building and providing a new HVAC system. Work includes new and altered walls, doors, finishes, ceiling, lighting and other architectural elements throughout most of the building.

2. The existing HVAC system will be removed and a new system installed.

3. Exterior work includes new HVAC units, roofing, roof well cladding and select site ADA improvements.

4. The estimated cost range is $1.5-2.5 million.

B. Additional requirements of all parties to the Contract include the following Bidding and Contracting Requirements:

1. Subcontractor List.

2. Agreement Form.

3. Bonds.

4. General Conditions.

5. Supplementary Conditions.

6. Oregon BOLI wage rates.

C. Related Bidding Requirements:

1. Preliminary Schedules: Construction Schedule requirements by Owner.

1.2 CONTRACTS

A. Standard Contract Form: Construct the Work under an agreement executed on AIA Document A101 - Stipulated Sum.

1.3 WORK UNDER OTHER CONTRACTS

A. Work Prior to This Contract:

1. Owner will perform separate Work or will employ separate contractors for Work on the Project prior to start of this Contract.

2. Selective demolition by separate contractors includes hazardous material abatement.

B. Work During This Contract:

1. Owner will employ separate contractors for Work on the Project which will be executed during this Contract which is excluded from this Contract.

2. Provide access to site and coordinate Work according to General Conditions.

3. Work during this Contract by separate contractors includes:

a. Installation of the audio visual equipment.

b. Furniture installation.

c. Access control vendor will install access control devices.

C. Work After This Contract:

1. Owner will employ separate contractors for Work on the Project, which will be executed after this Contract, which is excluded from this Contract.

2. Work after this Contract by separate contractors includes window coverings and building signage.

1.4 SITE INVESTIGATION AND REPRESENTATION

A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the Work; the general and local conditions, particularly those bearing upon storage of materials, availability of labor, water, electrical power, roads, or similar physical conditions at the site; and the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during the execution of the Work, and all other matters which can in any way affect the Work or the cost thereof under this Contract.

B. The Contractor further acknowledges that he has satisfied himself as to the character, quality and quantity of surface materials to be encountered from inspecting the site, all exploratory Work done by the Owner, as well as from information presented by the Drawings and Project Manual made a part of this Contract. Any failure by the Contractor to acquaint himself with all the available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work.

1.5 CONSTRUCTION SCHEDULE AND USE OF SITE

A. Construction Schedule Procedures: Construct Work in stages to accommodate Owner's and public's use of premises during the construction period. Coordinate construction schedule and site operations with Owner. Stages of construction are those indicated on Drawings and specified in Bidding Requirements Document "Preliminary Schedules."

B. Construction Schedule: The Contractor shall schedule the Work through to completion, giving copies of the schedule to all subcontractors, to be sure that the construction is actually completed by the Project deadline.

C. Contractor's Use of Premises:

1. Contractor shall limit his use of premises for Work and storage to allow for Work by other contractors, Owner occupancy and public use.

2. Coordinate use of premises under direction of Architect.

3. Move any stored products under Contractor's control which interfere with operations of the Owner or separate contractor.

4. Obtain and pay for the use of additional storage or work areas needed for construction.

5. Do not prohibit use of toilet facilities, corridors and required exits until the completion of one stage of construction provides alternative access.

6. Do not block fire truck access to the site. Designated fire lanes must remain open at all times unless other arrangements are made with the governing jurisdiction.

7. Dumping of construction waste on the site is prohibited, except for excess concrete and truck washout to be placed in areas to receive pavement.

1.6 TRAFFIC AND PARKING

A. Vehicle parking shall be limited to the construction area. Contractor's use of areas outside of the construction limits shall be only by arrangements made with appropriate governing agencies by the Contractor. Contractor shall pay all costs and fees related to said arrangements.

1.7 PUBLIC SAFETY AND CONVENIENCE

A. Comply with all rules and regulations of the City, State and County authorities regarding the closing of public streets or highways to use of public traffic. No road shall be closed to the public except by express permission of the governing authority. Conduct the Work so as to assure the least possible obstruction to traffic and normal commercial pursuits.

B. Protect all obstructions within traveled roadways by approved signs, barricades and lights where necessary for the safety of the public. The convenience of the general public and residents adjacent to the project and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

C. Whenever the Contractor's operations create a hazardous condition, he shall furnish flagmen and guards as necessary to give adequate warning to the public of any dangerous conditions to be encountered. Equip flagmen and guards, while on duty and assigned to give warning to the public, with approved red wearing apparel and a red flag which shall be kept clean and in good repair.

1.8 CLEANING AND PROTECTION

A. Clean all spilled demolition debris and other material caused by the construction operations from all streets and roads at the conclusion of each day's operation.

B. Emergency Provisions: The Contractor shall furnish the Owner with 24-hour telephone numbers of all key personnel, including key personnel of subcontractors, for use in case of any emergencies.

C. Noise Control: The Contractor shall provide and maintain adequate and effective mufflers, sound barriers and controls for all construction equipment such as compressors, jackhammers, vehicles, impact tools, power saws and similar equipment so that the noise from this equipment can be controlled to maintain a degree of comfort to the building occupants. Cooperate with the Owner when construction Work requires the use of equipment that may generate objectionable noise.

1.9 CONTINUED OWNER OCCUPANCY

A. Owner will occupy the IT department located in the basement during the entire period of construction for conducting normal operations. Cooperate with Owner in all construction operations to minimize conflict and to facilitate Owner usage. Contractor shall at all times conduct his operations to ensure the least inconvenience to the Owner. No smoking will be allowed in any areas of the building.

1. Contractor shall ensure that continuous power is supplied to IT areas and coordinate any disruptions with the Woodburn IT department.

2. Egress from the basement shall be ensured at all times.

B. Provide adequate protection and barriers for normal building activities and protection of personnel from the construction area.

1.10 EXISTING WORK AND FACILITIES

A. Construct carefully without damage or destruction of remaining facilities. Replace or repair damage caused by the Work to structures, surfaces, fixtures and materials with new Work equivalent to the existing, fully complying with original workmanship, materials and the Specifications.

B. Existing Utilities:

1. Protect active utilities, evident by reasonable inspection of the Project, whether or not shown on the Drawings. Protect, relocate, or abandon utilities encountered in the Work which are not shown on the Drawings or evident by inspection of the Work as directed by the Architect. Maintain continuity of utilities services to existing IT department.

2. All necessary service interruptions of utilities shall be scheduled with the Owner. Minor interruptions shall require a minimum of 48 hours prior notification. The major shut down of any utility shall require a minimum of seven days prior notice.

C. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 8 a.m. to 5 p.m., Monday through Friday, except otherwise indicated.

1. Weekend Hours: Negotiate with Owner.

2. Early Morning Hours: Negotiate with Owner.

3. Hours for Utility Shutdowns: Negotiate with Owner

4. Hours for Core Drilling: Negotiate with Owner.

D. Dust Curtains and Barriers: Use all precautions to confine dust to the work area by use of curtains, doors and other means.

1.11 RECORD DRAWINGS

A. The mechanical and electrical subcontractors will be furnished one set of Drawings to record installation. Show all buried or concealed exterior and interior installation as Work progresses. Show approved changes, indicate depth and location of all items, including piping, conduit, stubs and cleanouts by elevations and dimensions in relation to wall and other definable locations on the building.

B. Immediately after completion of all buried Work, these subcontractors shall record all buried installation information and return that portion of Record Drawings to the Architect.

1.12 SPECIFICATION FORMAT

A. These Specifications are of the abbreviated, simplified or streamlined type and include incomplete sentences. Omission of words or phrases such as "the Contractor shall," "in conformity therewith," "shall be," "as noted on the Drawings," "as detailed on the Drawings," "according to the plans," "a," "an," "the," and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the Drawings. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular, where applicable as the context of the Contract Documents indicates.

B. The Contractor shall provide all items, articles, materials, operations or methods listed, mentioned or scheduled either on the Drawings or specified herein, or both, including all labor, materials, equipment and incidentals necessary and required for their completion.

C. Whenever the words "reviewed," "approved," "satisfactory," "directed," "submitted," "inspected," or similar words or phrases are used, it shall be assumed that the word "Architect" follows the verb as the object of the clause, such as "approved by the Architect."

D. All references to standard specifications or manufacturer's installation directions shall mean the latest edition thereof.

END OF SECTION

ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances: Lump-sum.

C. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.

2. Division 9 Section “Gypsum Board Assemblies” for items of Work covered by allowances.

1.2 COORDINATION

A. Coordinate allowance items with other portions of the Work.

1.3 LUMP-SUM ALLOWANCES

A. Attic areas are subdivided by existing single layer gypsum board draftstops which have been compromised over time with access holes and unsealed penetrations. Provide allowance for sealing draftstop openings with 1/2" gypsum board.

1. Allowance Amount: $2000.

B. Allowance shall include cost to Contractor of specific products and materials and shall include taxes, freight, and delivery to Project site.

C. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials shall be included as part of the allowance.

1.4 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION

UNIT PRICES

PART 1 GENERAL

1.1 ROOF SHEATHING

A. Basic Bid: Include the cost of replacing 128 sq. ft. of plywood roof sheathing and 2” thick polyiso rigid insulation.

B. Unit Price: Provide a sq. ft. unit cost of replacing additional plywod roof sheathing and 2” thick polyiso rigid insulation.

C. Measurement and payment will be made only when this work is directed.

END OF SECTION

ALTERNATES

PART 1 GENERAL

1.1 SUMMARY

A. Owner Selected Adjustments:

1. The Work required and Lump Sum Contract price shall be modified by the Alternates selected by the Owner and incorporated into the Agreement Form.

B. Related Documents:

1. Bid Form: Comply with successful Bidder's lump sum price for each Alternate.

2. Agreement Form: Refer to Owner-selected Alternates as listed in the signed Agreement Form.

1.2 CONTRACT ADJUSTMENTS

A. Work Adjustments:

1. Adjust Work required by the Contract for each Alternate accepted by Owner.

2. Include changes in material, equipment, and fabrication.

3. Include changes in erection, installation, and finishing.

4. Adjust work to achieve the desired result as indicated on Drawings and specified in the related technical Sections for each Alternate selected by the Owner.

B. Contract Sum Adjustments: Owner will adjust the Contract Lump Sum as indicated in the successful bidder's Bid Form, which the Owner incorporates into the signed Agreement Form.

C. Bidder's Requirements:

1. Review Contract Documents for the Scope of Work required by each Alternate.

2. State in the Bid Form in the space provided the addition to or deduction from the Basic Bid for each Alternate listed in this Section.

D. Contractor's Requirements:

1. Alternate Work is outlined in this Section and is specified in detail in the technical Sections referenced in this Section.

2. Minor adjustments to exposed finish surfaces, or concealed Work by the incorporation of the selected Alternates may or may not be indicated on Drawings or be specified in the referenced Specifications.

3. Include adjustments in Work as required to achieve the intended result, consistent with requirements in the Contract Documents.

4. Coordinate Work modified by the incorporation of the Alternates.

E. Owner's Rights:

1. The Owner reserves the right to accept or reject any one or all of the Alternates.

2. The Owner reserves the right to reinstate Alternate Bids at any time within 30 days after Contract Award.

1.3 DESCRIPTION OF ALTERNATES

A. Alternate Number 1: Provide a deduct alternate cost for leaving existing visible conditions in locker rooms 152 and 155 and adjacent restrooms and shower areas as-is. This includes leaving existing flooring, showers and lighting as-is. Mechanical system to be modified as shown on plans.

B. Alternate Number 2: Provide a deduct alternate cost for not extending existing walls to structure above, as called for in offices 108, 110, 115, and 136.

C. Alternate Number 3: Provide a deduct alternate cost for leaving existing wall cladding at mechanical well as-is in lieu of replacing with new cladding.

D. Alternate Number 4: Provide a deduct alternate cost for removing fan-coil units, supply/return ducting and diffusers from basement rooms 001, 003, 005, 007, 008, 009 and 010

END OF SECTION

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions" or equivalent.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within time specified in Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests or equivalent.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 or equivalent.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive:

1. Architect may issue a Construction Change Directive on AIA Document G714 or equivalent. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

2. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation:

1. Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

2. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

END OF SECTION

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

2. Division 1 Section "Submittal Procedures" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.

b. Submittals Schedule.

c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.

b. Name of Architect.

c. Architect's project number.

d. Contractor's name and address.

e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets or equivalent.

3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section.

b. Description of the Work.

c. Name of subcontractor.

d. Name of manufacturer or fabricator.

e. Name of supplier.

f. Change Orders (numbers) that affect value.

g. Dollar value.

h. Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

8. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

B. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

C. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment or equivalent.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.

2. Schedule of Values.

3. Contractor's Construction Schedule (preliminary if not final).

4. Products list.

5. Schedule of unit prices.

6. Submittals Schedule (preliminary if not final).

7. List of Contractor's staff assignments.

8. List of Contractor's principal consultants.

9. Copies of building permits.

10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

11. Initial progress report.

12. Report of preconstruction conference.

13. Certificates of insurance and insurance policies.

14. Performance and payment bonds.

15. Data needed to acquire Owner's insurance.

16. Initial settlement survey and damage report if required.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.

4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."

5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."

6. AIA Document G707, "Consent of Surety to Final Payment."

7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

9. Final, liquidated damages settlement statement.

END OF SECTION

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project Coordination.
2. Administrative and Support Personnel.
3. Pre-Construction Conference.
4. Site Mobilization Conference.
5. Special Inspection Conference.
6. Progress meetings.
7. Pre-Installation Conferences.
8. Administrative Submittals:
    a. Shutdown Requests.
    b. Hot Work Permit.
    c. Request for Information (RFI).
9. Layout of Work.
10. Cleaning and Protection.

B. The project will have selected building systems commissioned. The equipment and systems to be commissioned are specified in Division 1 Section “General Commissioning Requirements.” The commissioning process is described in Division 1 Section “General Commissioning Requirements.”

C. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for preparing and submitting Contractor's Construction Schedule.
2. Division 1 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 1 Section "Closeout Procedures" for coordinating closeout of the Contract.
4. Division 1 Section "General Commissioning Requirements."

1.2 PROJECT COORDINATION

A. Coordinate scheduling, submittals, and Work of various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 ADMINISTRATIVE AND SUPPORT PERSONNEL

A. In addition to General Superintendent and other administrative and support personnel required for performance of Work, provide Project Coordinator experienced in administration and supervision of building construction, including mechanical and electrical work. Project Coordinator is required to act as general coordinator of interfaces between units of Work.

B. Owner reserves right to review qualifications and experience of general superintendent and project coordinator and to accept or reject Contractor's proposal for staff members filling these positions.

C. Contractor shall submit to Owner and Architect, within five days of Notice to Proceed, proposed listing of all principal staff members and their assignments, consultants and subcontractors. List shall include business hour phone numbers and addresses as well as emergency phone numbers for off-hour contact on 24-hour basis in event of emergency.

1.4 PRECONSTRUCTION CONFERENCE

A. Owner and Architect will arrange, prior to commencement of Work, Preconstruction Conference to cover following agenda:

1. Introduction.

2. Explain:

a. Execution of Owner-Contractor agreement.

b. Submission of executed bonds and certificates of insurance.

c. Distribution of Contract Documents.

d. List of subcontractors, products and Schedule of Values.

e. Responsibility of each participant.

f. Inspection procedures.

g. Progress Schedules.

h. Progress Payment procedures.

i. Submittals and Approvals.

j. Routing of correspondence.

k. Change Order procedures.

l. Final Inspection procedures.

3. Review:

a. Product identification/temporary signs.

b. System for daily collection, recycling, and disposal of waste materials from site.

c. Special coordination problems.

d. Use of Owner's property.

e. Work hour restrictions.

f. Ingress and egress to site, traffic and parking rules.

g. Demolition procedures.

h. Special restrictions, i.e., noise-abatement, etc.

i. Special requirements such as BOLI wage rates.

j. Certifications.

k. Safety, fire and security.

l. Insurance responsibilities.

m. Hazardous materials.

n.

4. Confirm:

   a. Critical layout situations.

   b. Existing conditions of Site and adjacent areas.

   c. Sources of temporary utilities.

   d. Points of connection to existing facilities.

5. Determine:

   a. Contractor's plan of operations.

   b. Line of authority in Contractor's organization.

   c. Off-hour contacts in case of emergency.

   d. Safety and security arrangement contemplated by Contractor(s).

   e. Address and telephone numbers of Architect, Contractor and subcontractors.

6. Commissioning: Commissioning will include a scoping meeting where all members of the design and construction team to be involved in the commissioning process meet and agree on the scope of work, tasks, schedules, deliverables, and responsibilities for implementation of the Commissioning Plan.

1.5 SITE MOBILIZATION CONFERENCE

A. Owner will schedule conference at Project Site prior to Contractor occupancy. If deemed appropriate by Owner, Site Mobilization Conference agenda may be combined with Pre-construction Conference.

B. Attendance required: Owner, Architect, special consultants, Contractor and major subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.

2. Owner's requirements and partial occupancy.

3. Construction facilities and controls provided by Owner.

4. Temporary utilities provided by Owner.

5. Survey and building layout.

6. Security and housekeeping procedures.

7. Schedules.

8. Procedures for testing.

9. Procedures for maintaining record documents.

10. Requirements for start-up of equipment.

11. Inspection and acceptance of equipment put into service during construction period.

1.6 SPECIAL INSPECTION CONFERENCE

A. Within five (5) days of Notice to Proceed, Owner and Architect, together with representative of governing jurisdiction, shall arrange meeting to clarify requirements and conditions for Special Inspections which may be required by governing jurisdiction. The Contractor and Test Lab/Special Inspections firm shall be represented at that meeting.

1.7 PROGRESS MEETINGS

A. Contractor shall attend weekly coordination meetings arranged by Owner at regularly scheduled times. Additional specific meetings may also be held for other purposes. Contractor and other persons involved in coordination and planning for Work, such as prime Subcontractors, shall attend as appropriate. Meetings, which will also be attended by Architect, Owner and other appropriate persons, shall be conducted utilizing following agenda:

1. Comments or revisions to previous meeting notes.

2. Construction schedule review.

3. Submittals status.

4. Proposal Request status.

5. RFI status.

6. Other quotations.

7. Design/Construction issues, old and new.

8. Information.

9. Site Observations.

10. Commissioning: Progress meetings during equipment start-up and functional performance testing shall include commissioning coordination in addition to the standard meeting format.

B. Meeting just prior to last meeting of the month:

1. Provide draft payment applications for review at the meeting.

2. Provide all back up for any COR/Change Order to appear on current month’s application.

3. Correction, revisions or pre-approval of these documents will be made at this meeting, so the final documents will be provided at the last meeting for execution and signing by all necessary parties.

C. Contractor, who will be responsible for documentation of meetings, will distribute copies of Progress Meeting notes to attendees and appropriate parties, so they are received no later than two business days prior to next regularly scheduled meeting.

1.8 PRE-INSTALLATION CONFERENCES

A. Contractor shall schedule and hold Pre-Installation Conferences at Site well before installation of each unit of work that requires coordination with other work. Installers and representatives of manufacturers and fabricators who are involved in or affected by each unit of work shall attend. Advise Architect and Owner a minimum of two weeks prior to conference of schedule of meetings, dates, subject, and if consulting engineer is required. At each meeting review progress of other work and preparations of particular work under consideration, including specific requirements for following issues:

1. Contract Documents.

2. Options.

3. Related Change Orders.

4. Purchases.

5. Deliveries.

6. Shop Drawings, Product Data and quality controls samples.

7. Product and Material requirements.

8. Compatibility and possible conflicts.

9. Time schedules.

10. Weather limitations.

11. Manufacturer’s recommendations.

12. Acceptability of substrate.

13. Temporary facilities.

14. Space and access.

15. Governing regulations.

16. Safety.

17. Inspection, testing and maintenance requirements.

18. Required performance.

19. Recording requirements.

20. Protection.

21. Warranty requirements.

22. Commissioning: Commissioning will include a scoping meeting where all members of the design and construction team to be involved in the commissioning process meet and agree on the scope of work, tasks, schedules, deliverables, and responsibilities for implementation of the Commissioning Plan.

B. Record discussions of each conference. Distribute meeting minutes promptly to all involved, including Architect and Owner. When deemed appropriate by the Owner, Pre-installation conferences may be held in conjunction with regularly scheduled Progress Meetings.

C. Do not proceed with Work if pre-installation is not successfully concluded. Initiate action necessary to resolve issues and re-convene conference as soon as possible. Failure on part of Contractor to resolve issues which may delay project will not be considered as grounds for approval of Change Orders requesting additional Contract Time or compensation.

1.9 ADMINISTRATIVE SUBMITTALS

A. Shutdown Requests:

1. All necessary service interruptions of utilities of any type or magnitude shall be scheduled in advance with Owner. Major utility shutdowns are required to be scheduled between hours of 5:30 p.m and 6:00 a.m. Scheduling of shutdown shall be through submittal of Shutdown Request at least seven days prior to scheduled shutdown. Minor utility service interruptions shall be scheduled with minimum of two days prior notice through submittal of Shutdown Request.

2. Major shutdown is generally regarded as interruption of any single or group of services or utilities serving entire building, wing, floor, or group of spaces where occupants' normal operation would be affected by loss of service or utilities lost as result of shutdown.

3. Minor shutdown may be regarded as interruption of single or group of service or utilities to area not occupied at time of shutdown, or when services or utilities would pose no inconvenience to occupant activities, systems or equipment, or when affected utilities are restricted to areas occupied by Contractor engaged in ongoing work.

B. Hot Work Permits: Work requiring any concrete cutting or brazing, grinding, welding or soldering of metals, or any work producing gases or particulate capable of activating ionization or smoke/heat detectors, shall required five days notice and submittal of Hot Work Permit. Failure to prepare permit and notify Owner of this work that results in Fire Department false alarm will result in pass-through of false alarm fine to Contractor.

C. Request for Information (RFI): Design Clarifications/Interpretations:

1. General: When Contractor requires a clarification or information regarding Work, this shall be initiated by submittal of Request for Information. RFI is designed to deal with on-site concerns that, for whatever reason, are not adequately clarified in Contract Documents, and can not be easily resolved at the Site with assistance of the Owner's representative.

2. Contractor shall submit all RFI's. No RFI's will be accepted from sub-contractors, suppliers, or others, unless first submitted to Contractor.

3. Contractor shall thoroughly review, date and sign all submitted RFI's. Contractor shall thoroughly review RFI's with respect to Contract Documents prior to submitting RFI's to Architect, and notify affected parties of any potential cost or schedule impact.

4. Architect will receive only properly prepared and submitted RFI's. Architect will stamp for date received, review with Documents and Owner for decision, and process within 10 working days.

5. Form: RFI form is to be submitted to Architect, with top section filled out by Contractor. Include required response date to establish when Project may be adversely impacted. This date may be no less than 7 calendar days from initiation date. Incomplete forms may be returned by Architect, resulting in delay in processing. Use additional forms, diagrams or marked-up drawings where necessary. Method of transmittal to Architect should reflect urgency of response.

6. The RFI process is not intended for Contractor questions when answers are contained in the Contract Documents. RFI's whose answers are evident in the Contract Documents will be rejected and returned by the Architect without further action required.

1.10 LAYOUT OF WORK

A. Verify conditions of project site. Purpose of survey is to record existing conditions prior to construction for comparison with Contract Documents. Report all conflicts to Architect. Architect will provide revisions to Contract Documents or issue instruction to deal with conflicts. Contractor shall be responsible for remedying conflicts which could have been prevented by timely review of existing conditions. All remedies, which vary from Contract Documents shall be approved by Architect and Owner.

B. Be responsible for properly laying out Work, and for all lines and measurements for all Work executed under Contract Documents. Verify dimensions shown on Shop Drawings and report errors or inaccuracies in writing to Architect before commencing work.

C. Be responsible for coordination and installation of all architectural, mechanical and electrical work. Owner will not entertain requests for delays, time expansion or additional costs due to lack of coordination of Work by Contractor.

D. Mechanical and electrical trades shall be responsible for layout of duct work, piping and conduit based on reference lines shown on Drawings.

1. Because of their small scale, Mechanical, Plumbing, Electrical Drawings are diagrammatic and do not show all offsets, fittings and accessories which may be required.

2. Investigate structural and finish conditions affecting Work and arrange Work accordingly.

3. Provide fittings and accessories as required to fit job conditions.

E. Prepare detail layout drawings to a larger scale than Contract Documents in areas where Work is of sufficient complexity to warrant additional detailing. This shall apply to all Mechanical and Electrical Rooms, wiring at switchboards and motor control centers, panelboard cabinets in electrical closets, and sprinkler piping layouts. Prepare drawings on tracings of same size as Contract Drawings and submit with each set of Owner's Record Drawings. Submit layout drawings for approval before commencing shop fabrication or field erection, only when so directed by Architect.

F. Slots, chases and openings through floors, walls, ceilings and roofs as specified in new construction shall be provided by various trades. Trade requiring them shall insure that they are installed and properly located, and shall be responsible for any cutting and patching caused by their omission or improper location.

G. Anchor bolts, sleeves, inserts and supports that are required shall be furnished and installed under same Section of Specifications as respective items to be anchored, with locations as directed by trade requiring them.

H. Sprinkler Heads and Other Devices: Automatic sprinklers shall be installed generally throughout all areas. Check locations selected for all sprinkler heads and check Architectural reflected ceiling plans to prevent conflicts between trades. In cases where electric outlet or light fixture and sprinkler head occupy same position, Architect will decide which shall be shifted. Exposed sprinkler piping in finished areas will not be allowed unless it is evident that the Contract Documents intended the piping to be exposed.

I. Provide clearance and headroom. Utilize spaces efficiently so that adequate accessibility is retained for future maintenance, repairs, modifications and additions.

J. Relocate installed work which does not provide adequate accessibility.

K. Changes required in Work of Contractor, caused by Contractor's neglect to coordinate Work with others, shall be made at Contractor's own expense.

L. Do all necessary Work to receive or join with Work of all trades.

M. Coordinate Work to provide adequate clearances for installation and maintenance of equipment.

N. Installation and Arrangement: Install Work to permit removal of parts requiring periodic replacement or maintenance.

1. Arrange pipes, ducts, raceways and equipment to permit ready access to valves, cocks, traps, starters, motors, and control components.

2. Arrange raceways, wiring and equipment to permit ready access to switches, motors and control components. Doors and access panels shall be kept clear.

3. Right-of-Way: Lines which pitch shall have right-of-way over conduit and EMT

raceways. Lines whose elevations cannot be changed shall have right-of-way over conduit and EMT raceways whose elevations can be changed.

4. Offsets, and changes in direction of pipes, ducts and raceways shall be made as required to maintain proper headroom and clearances whether or not indicated on Drawings. Provide all traps, vents, fittings, junction boxes, connectors, etc., as required to effect these offsets and change in direction.

O. Drawings and Specifications are arranged for convenience only and do not necessarily determine which trades perform various portions of Work.

P. Transmit to trades doing Work of other Divisions all information required for Work to be provided under their respective Sections (such as foundations, electric wiring, access door locations, etc.) in ample time for their installation.

Q. Consult with trades doing Work of other Divisions so that:

1. Required related Work and information is received from them in ample time for installation.

2. Whenever possible motors, motor controls, pumps, valves, etc., are of same manufacturer.

R. Do not install valves, filters, or other devices that require periodic maintenance in locations difficult to access.

1.11 CLEANING AND PROTECTION

A. During handling and installation of Work at Project Site, clean and protect Work progress and adjoining Work on basis of continuous maintenance. Apply protective covering for stored or installed Work where it is required for proper protection from damage or deterioration, up until Substantial Completion if necessary.

END OF SECTION

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.

2. Periodic construction photographs.

3. Final Completion construction photographs.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submitting photographic documentation.

2. Division 1 Section "Selective Demolition" for photographic documentation before selective demolition operations commence.

3. Division 1 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.

4. Division 1 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

1.2 SUBMITTALS

A. Qualification Data: For photographer.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation construction. Include same label information as corresponding set of photographs.

C. Construction Photographs: Submit digital images of each photographic view within seven days of taking photographs.

1. Identification: Include the following text identification with each photograph:

a. Name of Project.

b. Date photograph was taken shall be date stamped by camera.

c. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

d. Unique sequential identifier.

2. Record Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.3 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.4 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed JPEG format, produced by a digital camera with minimum sensor size of 10.0 megapixels, and at an image resolution of not less than 1600 by 1200 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified commercial photographer to take construction photographs.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.

2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

D. Preconstruction Photographs: Before commencement of excavation, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag excavation areas before taking construction photographs.

2. Take eight photographs to show existing conditions adjacent to property before starting the Work.

3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take 12 digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of digital photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take eight color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.

1. Do not include date stamp.

H. Additional Photographs: Architect may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.

1. Three days' notice will be given, where feasible.

2. In emergency situations, take additional photographs within 24 hours of request.

3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.

b. Immediate follow-up when on-site events result in construction damage or losses.

c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.

d. Substantial Completion of a major phase or component of the Work.

e. Extra record photographs at time of final acceptance.

f. Owner's request for special publicity photographs.

END OF SECTION

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Make submittals required by the Contract Documents and revise and resubmit as necessary to establish compliance with the specified requirements.

B. Related Sections:

1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of this Project Manual.

2. Individual requirements for submittals may also be described in pertinent Sections of this Project Manual.

3. The process for securing approval of proposed substitutions is described in Division 1 Section "Product Requirements."

C. Work Not Included:

1. Unrequired submittals will not be reviewed by the Architect.

2. The Contractor may require his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the Work, but such data shall remain between the Contractor and his subcontractors and will not be reviewed by the Architect unless specifically called for within the Contract Documents.

1.2 QUALITY ASSURANCE

A. Coordination of Submittals:

1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.

2. Verify that each item and the submittal for it conform in all respects with the specified requirements.

3. The Contractor's signature on each submittal certifies that this coordination has been performed.

1.3 SUBMITTAL PROCEDURES

A. General: Use of Contract Documents in electronic media format will be permitted upon receipt of signed and dated "Agreement Between Contractor and Architect Concerning Use of Electronic Media" (form included in Division 0).

B. Electronic Submittals: All submittal documentation and procedures detailed in this specification section that lend themselves to transfer by digital electronic media shall be submitted in an electornic format as approved by the Architect.

PART 2 PRODUCTS

2.1 PROGRESS SCHEDULE

A. Prepare and maintain a construction progress and payment schedule of form approved by the Architect. The schedule shall include timing of material testing and special inspections, material ordering, shop drawing submittals, plus monthly billing projection.

1. Submit progress schedule electronically in format acceptable to the Owner.

B. Update and submit full size prints of this form with each subsequent application for payment showing the percent of complete of each subdivision of the Work, actual monthly payment request, and actual percentage complete curve.

C. Prior to start of construction, prepare a phased construction schedule, in cooperation with the Owner, to allow the building services and functions to schedule and prepare for necessary utility interruptions and shutdown during the progress of the construction.

2.2 SHOP DRAWINGS

A. Scale and Measurements: Make shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the items. Include drawings showing shop assembly, field measurements, connections, details, dimensions, finishes, and fasteners.

1. Submit shop drawings electronically in format acceptable to the Owner.

2. Review comments of the Architect will be submitted electronically on electronically submitted shop drawings.

2.3 PRODUCT DATA

A. When product data is specified in a technical Section, submit manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other descriptive data on manufactured products and systems.

B. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portion of the contents is being submitted for review.

C. Submit a maximum of three copies which will be returned, plus three copies which will be retained by the Architect.

1. Submit product data electronically in format acceptable to the Owner.

2.4 SAMPLES

A. When product samples are specified in a technical Section, submit product samples of size specified and of sufficient size to clearly illustrate characteristics of product or system.

B. Provide samples identical to the precise article to be provided. Identify as described under "Identification of Submittals" below.

C. Number of Samples Required:

1. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus one which will be retained by the Architect.

2. By prearrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Architect.

2.5 COLORS AND PATTERNS

A. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Architect for selection.

2.6 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual Specification Sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflict between manufacturer's instructions and Contract Documents.

2.7 MANUFACTURER'S CERTIFICATES

A. When specified in individual Specification Sections, submit manufacturer's certificate to Architect for review, in quantities specified for Product Data.

B. Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

PART 3 EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

A. Consecutively number all submittals and label with the Specification Section number.

1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new submittal number.

2. On resubmittals, cite the original submittal number for reference and clearly mark the document as "resubmitted."

B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.

C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.

D. Submittal Log:

1. Prior to first application for payment, provide an electronic spreadsheet log listing all submittals required. Electronic spreadsheet program shall be acceptable to Owner.

2. Maintain an accurate submittal log for the duration of the Work, showing the current status of all submittals at all times.

3. Make the submittal log available to the Architect for the Architect's review upon request.

3.2 GROUPING OF SUBMITTALS

A. Unless otherwise specified, make submittals in groups containing all associated items to ensure that information is available for checking each item when it is received.

1. Partial submittals may be rejected as not complying with the provisions of the Contract.

2. The Contractor may be held liable for delays caused by incomplete submittals.

3.3 TIMING OF SUBMITTALS

A. Make submittals far enough in advance of scheduled dates for fabrication and installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.

B. In scheduling, allow at least ten working days for review by the Architect following the Architect's receipt of the submittal. For submittals that require review by the Architect and the Architect's consultants, allow an additional ten working days for each consultant.

END OF SECTION

DESIGN BUILD REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for portions of Work under this Contract that are Design-Build.

B. Contractor's responsibility is to coordinate and assume or assign to subcontractors complete responsibility for design, preparation of Contract Documents, calculations, submittals, permits, code appeals, fabrication, transportation and installation.

1. Contractor to submit and coordinate Design-Build documents to Governing Jurisdiction for separate permit.

2. Contractor responsible to complete Design Build Summary Sheet.

3. Design-Build components of Work are defined as complete, operational systems, provided and installed for their intended use.

C. Design Professional is Project Architect or Engineer of Record.

1. Review of Design-Build Submittals by Architect or Engineer of Record shall be for design intent only and shall not lessen nor shift responsibility from Contractor or assigned subcontractor, to Owner nor Design Professional.

2. Owner is not responsible to pay for any delays, additional products, additional hours of work or overtime, restocking or rework required due to failure by Contractor or Subcontractor to coordinate their work with work of other trades on Project or to provide Design-Build portion or component in a timely manner to meet Project Schedule.

D. Contractor shall be responsible for and pay cost of all required design, submittals, permits and fees and coordination for Work of this Section.

E. Related Sections:

1. Division 0 Section General and Supplementary Conditions of the Contract."

2. Division 1 Section "Project Management and Coordination."

3. Division 1 Section "Submittal Procedures."

4. Division 1 Section "Closeout Procedures."

1.2 DESIGN-BUILD COMPONENTS OF WORK

A. Design-Build Components include, but not limited to:

1. Section 03 10 00- CONCRETE FORMWORK

2. Section 05 50 00- METAL FABRICATIONS

3. Section 07 84 00- FIRESTOPPING

4. Section 09 51 10- SUSPENDED ACOUSTIC CEILINGS

5. Sectoin 09 54 25- LINEAR WOOD CEILING SYSTEMS

6. Section 09 54 26 – WOOD PANEL CEILINGS AND WALLS

7. Mechanical Unit Attachment to Primary Structure

8. Fire Sprinkler System

9. Fire Alarm System

1.3 DESCRIPTIONS

A. Refer to systems descriptions in Part 1, General and Part 2, Products in each technical specification Section listed for references to Design Build Work.

1.4 QUALITY ASSURANCE

A. Refer to Quality Assurance described in Part 1 - General in individual Sections with Design Build Work.

B. Quality assurance described in Specification Sections shall be minimum acceptable standards for this project. Should quality assurance not be defined within specific Specifications, printed industry standards for "normal" quality practices shall govern.

1.5 REFERENCES

A. Refer to References in Part 1 - General, in individual Sections with Design-Build Work. Comply with the provisions of Division 1 Section “References.”

1.6 SUBMITTALS

A. Refer to Submittals in Part 1 - General, in individual Sections with Design-Build Work.

1.7 Design-Build Submittals shall contain:

A. Complete criteria.

B. Design assumptions.

C. Details.

D. Calculations.

E. Stamped by Design-Build Engineer licensed in State of Oregon.

F. Instructions for fabrication, assembly, installation and interface with other trades.

1.8 SPECIFIC REQUIREMENTS AND DEFINITIONS

A. Submit list of proposed Design-Build Subcontractor(s) and/or Engineer(s) not more than fifteen days after signing Notice to Proceed.

B. Submit Design-Build Summary Sheet to governing authorities if required.

C. Design-Build Elements indicated in Contract Documents are for design intent only.

D. Intent is that Design-Build Entity is responsible to design, provide, coordinate and install Design-Build Component.

1. Required Submittals to governing jurisdictions, permits, Code appeals, etc. are Contractor's responsibility.

E. Design-Build Elements that attach to structural frame or are supplemental to structural frame shall be designed for anticipated loads outlined in the Contract Documents and required by the International Building Code as modified by the Oregon Structural Specialty Code.

F. Coordinate Design-Build Elements with appropriate subcontractors.

G. Clearly identify load reactions at interface between Design-Build Elements and structural frame for review by Structural Engineer of Record.

END OF SECTION

REFERENCES

PART 1 GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Except to the extent more explicit of more stringent requirements are written directly into the contract documents or are required by governing regulations, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference. In case of a conflict between the referenced standard and the project specifications, the project specifications shall govern.

B. Referenced Standards: Industry standards which are referenced in the contract documents have precedence over non-referenced standards which are, nevertheless, seen to be intended by their producers for application to work similar to that required for this project.

C. Non-Referenced Standards: Industry standards which are not specifically referenced in the contract documents for applicability to the work, including standards produced by those associations and agencies listed in this section (but not referenced elsewhere), are applicable as a

general measurement of whether the performed work complies with recognized standards of the construction industry.

D. Publication Dates: In each instance, comply with the standard or trade association publications which was in effect at the date of the contract documents, except where specifically indicated to comply with a publication of another date. References in the specifications have generally omitted the date indicator which frequently accompanies the identification number for the standards and publications indicated. Submit requests for approval of standards or publications of a different date. Substantial changes in the work which result from approval of standards or publications of a different date shall be processed as change orders in conjunction with such approval, at no change in price.

E. Copies of Standards: In connection with the requirements (specified elsewhere in the contract documents) that each entity performing the work be expert in the portion of work being performed, each such entity is hereby also required to be familiar with recognized industry standards applicable to that portion of work. In general, copies of applicable standards have not been bound with the contract documents. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source. Although certain copies needed for enforcement of the requirements may be specified as required submittals, the Owners Representative reserves the right to require the Contractor to submit copies of additional applicable standards as needed for enforcement of the requirements.

1.3 ABBREVIATIONS AND ACRONYMS

A. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADA	Dept. of Justice ADA Regulations Dept. of Justice 2010 ADA Standards for Accessible Design Accessibility Guidelines for Buildings and Facilities Available from U. S. Access Board www.access-board.gov	(800) 872-2253
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-6257
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences	(202) 289-7800

	www.nibs.org	
FTMS	Federal Test Method Standard (See FS)	
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association (Now part of CPA)	
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300

REFERENCES

AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industry International) www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (571) 323-3636
AWPA	American Wood-Preservers' Association www.awpa.com	(334) 874-9800

REFERENCES

AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI www.bicsi.org	(800) 242-7405 (813) 979-1991
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
FMRC	Factory Mutual Research (Now FMG)	

GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Now GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690

LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (804) 314-8955
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6623 (281) 228-6200
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550

REFERENCES

NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (303) 697-8441
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.org	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NWCB	NW Wall and Ceiling Bureau www.nwcb.org	(206) 524-4243

REFERENCES

NWWDA	National Wood Window and Door Association (Now WDMA)	
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc.	(864) 646-8453

	www.tileusa.com	
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICBO	International Conference of Building Officials (See ICC)	

ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Building Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
SD	State Department www.state.gov	(202) 647-4000

END OF SECTION

QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building code inspections.
2. Building code special inspections.
3. Extra tests and inspections.
4. Concrete floor alkalinity and moisture testing.
5. Field samples.

1.2 DEFINITIONS

A. Approved Agency:

1. Independent: Objective, compentent and independent from the Contractor responsible for the work being inspected, including disclosure of possible conflicts of interest so that objectivity can be confirmed.
2. Special Inspector Qualifications: Meet the requirements of the current Oregon Structural Specialty Code, section 1704.

1.3 REQUIREMENTS

A. Specific special inspection requirements are found in the specification Sections.

B. Approved Agency Qualifications:

1. Meet “Recommended Requirements for Approved Agency Qualification,” published by American Council of Independent Laboratories.
2. Acceptable to Owner, Architect, Structural Engineer, and local building authorities.

1.4 ENGINEERING, TESTING, AND INSPECTIONS REQUIRED BY BUILDING CODE

A. Work by Owner for Special Inspections:

1. Owner shall employ an Approved Agency to conduct Special Inspections that are required by the governing building code jurisdiction.
2. Owner shall pay for all inspection and testing services that indicate that construction is in conformance with Contract Documents.

B. Work by Contractor for Inspections and for Special Inspections:

1. Notify Architect and Approved Agency 24 hours prior to need for testing, inspection, and sampling. Approved Agency services shall be scheduled during normal business hours.

2. Cooperate with field testing personnel, provide access to work.

3. Facilitate testing and continuous inspection.

4. Notify building officials when Building Code required tests and inspections are ready for testing and inspecting.

5. Pay for tests and inspections where Work does not meet Contract Document requirements, including subsequent tests and inspections until such Work meets Contract Document requirements.

6. Pay for overtime charges when Approved Agency services are performed outside of normal business hours.

C. Work by Approved Agency:

1. Specified and Building Code Required Tests and Inspections:

a. Perform tests and inspections as required by Contract Documents and local Building Code. Special Inspections include, but are not limited to:

(1) Refer to Structural Notes on the Drawings.

b. Test and inspect materials, mixes, and systems to determine compliance with requirements of Contract Documents.

c. Provide sampling equipment and personnel, deliver samples to the testing laboratory and record field measurements as required by Contract Documents.

d. Comply with requirements of IBC, Special Inspections.

e. Provide tests and inspections required by Local Building Officials.

f. Owner will pay for tests and inspections where Work conforms to the Contract Document requirements.

2. Extra Tests and Inspections:

a. When directed by the Architect or otherwise required, provide extra tests and inspections to verify material compliance with requirements of Contract Documents.

b. Owner will pay for extra tests and inspections where Work conforms to the Contract Document requirements.

c. Contractor will pay for extra tests and inspections where Work fails to comply with Contract Document requirements.

3. Limits of Approved Agency Duties: Approved Agency is not authorized to modify Contract Documents, approve or accept Work, nor perform duties of Contractor.

4. Test and Inspection Reports:

a. Indicate on Each Test and Inspection Report:

(1) Project name and date of report.

(2) Approved Agency name, address, telephone number, and name of laboratory inspector.

(3) Date and time of sampling, testing, and inspecting.

(4) Ambient temperature and weather conditions at the site and curing conditions of samples.

(5) Product identification and referenced Specification Section.

(6) Location of sample, test, or inspection in the Project.

(7) Type of inspection or test.

(8) Results of sample, test, or inspection and evaluation of compliance with requirements in Contract Documents.

b. Distribution of Reports: Distribute one copy of each test and inspection report to the Architect, Owner, local building official, and provide two copies to the Contractor.

1.5 NON-CODE REQUIRED TESTING

A. Work by Owner for non-code testing.

1. Owner shall employ an Approved Agency to conduct concrete floor moisture testing.

2. Owner shall pay for all testing services that indicate that construction is in conformance with Contract Documents.

B. Work by Contractor for non-code testing.

1. Notify Architect and Approved Agency 24 hours prior to need for testing. Approved Agency services shall be scheduled during normal business hours.

2. Cooperate with field testing personnel, provide access to work.

3. Provide environmental conditions for concrete floor moisture testing as required by the flooring manufacturer's test procedure.

4. Pay for tests where Work does not meet Contract Document requirements, including subsequent tests until such Work meets Contract Document requirements.

5. Pay for overtime charges when Approved Agency services are performed outside of normal business hours.

C. Work by Approved Agency:

1. Perform concrete floor moisture testing in accordance with flooring manufacturer's requirements.

2. Provide testing equipment and personnel to record field measurements.

3. Extra Tests and Inspections:

a. When directed by the Architect or otherwise required, provide extra tests to verify material compliance with flooring manufacturer's warranty requirements.

b. Owner will pay for extra tests and inspections where Work conforms to the flooring manufacturer's warranty requirements.

c. Contractor will pay for extra tests and inspections where Work fails to comply with flooring manufacturer's warranty requirements.

4. Test Reports:

a. Indicate on each test report:

(1) Project name and date of report.

(2) Approved Agency name, address, telephone number, and name of laboratory inspector.

(3) Date and time of testing.

(4) Location of moisture test.

(5) Results of test and evaluation of compliance with requirements in Contract Documents.

b. Distribution of Reports: Distribute one copy of each test report to the Architect, Owner and provide two copies to the Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction.

B. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

3.2 EVALUATION OF TESTS AND INSPECTIONS

A. Satisfactory completion of work will be judged on results of laboratory and site tests and inspections.

B. If results of tests and inspections indicate work is below requirements of Contract Documents, that portion of work is subject to condemnation.

C. Contractor to remove and replace work so condemned at Contractor's expense until such work meets requirements of Contract Documents.

END OF SECTION

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Provide temporary job site facilities and services as required for use on, but not limited to, items listed in this Section.

B. Supervise and coordinate temporary facilities normally furnished and maintained as part of subcontractor's work.

1.2 REFERENCES

A. National Fire Protection Association (NFPA).

B. Occupational Safety and Health Act (OSHA).

1.3 CONTRACTOR'S CONSTRUCTION OFFICE

A. Owner will make available, in the existing building, space for the Contractor’s construction office.

1.4 SANITARY FACILITIES

A. Available at the Site, Owner provided.

1.5 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1.6 UTILITIES

A. General: All shut-off locations are to be documented for emergency purposes prior to pre-construction meeting.

B. Lighting:

1. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

C. Telephone Service:

1. Provide phone service in the Construction Office including fax and electronic communication service through internet access.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.

b. Ambulance service.

c. Contractor's home office.

d. Architect's office.

e. Engineers' offices.

f. Owner's office.

g. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

D. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

F. Heat and Ventilation:

1. Provide and pay for temporary heat as required to dry out the Work, maintain acceptable temperatures in materials and spaces as necessary for the proper accomplishment of the Work.

2. Ventilate all spaces to adequately assist drying-out and remove smoke, gasses and fumes harmful to persons and the Work. Provide temporary ducts or flues to vent combustion gasses from heating equipment to the outside.

3. Use only temporary heating equipment bearing UL or other acceptable label certifying that the equipment has been approved for the use intended and all required safety devices are provided; maintain in good repair and properly adjusted to operate free from smoke, fumes, and fuel leaks.

4. Remove temporary heating system from the premises as soon as permanent heat system is ready for use. Include all temporary and permanent heat system fuel and operation costs until Substantial Completion. The Project's air handling system shall be in operation a minimum of 30 days prior to Substantial Completion.

1.7 ENCLOSURES

A. Open-Mesh Fencing:

1. Provide 9 gauge galvanized 2-inch chain link fabric fencing 6-feet high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2-inches i.d. for line posts and 2-1/2-inches i.d. for corner posts, set in compacted mixture of gravel and earth.

2. Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates. Provide panelized system at Contractor's option.

B. Provide temporary doors on doorways and other openings to secure the premises from unauthorized entry. Cover window and other exterior wall and roof openings to prevent weather damage. Install temporary enclosures where required to maintain adequate conditions for the installation of Work.

C. Cover and protect all glazing subject to impact from breakage and replace any broken glass with new during the contract time.

D. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1.8 FINISHES PROTECTION

A. Provide protection for finish surfaces as required to preserve them in "new" condition until Substantial Completion.

B. Restore permanent facilities used during construction to their specified and/or original condition.

1.9 EROSION CONTROL

A. Provide and maintain erosion control measures as required by the city, county, state and federal governments. Pay all fines or other penalties levied for improper erosion control or lack of maintenance. Provide 8-inch x 10-inch photographs of erosion control devices in place.

1.10 SUPPORT FACILITIES

A. Waste Disposal Facilities: Comply with requirements specified in Division 1 Section "Construction Waste Management."

1.11 CONSTRUCTION SAFETY

A. Ensure that all scaffolding, staging, temporary floors, runways, and similar devices furnished for the installation of any Work be built and maintained to safely support required loads.

B. Ensure that all cranes, hoists, and other lifting equipment necessary for the erection of materials have operators trained and experienced in the equipment being used, and are properly equipped with guys, bracing, and safety devices as required by applicable codes.

C. Comply with all applicable local safety codes and specifically the Occupational Safety and Health Act (OSHA) for the construction industry.

D. Unless written approval is obtained from governing jurisdiction, construction must not obstruct private or public streets, driveways, pedestrian walkways, ADA routes, fire lanes, egress of occupied buildings, etc.

1.12 FIRE PREVENTION AND PROTECTION

A. Perform all Work in a fire-safe manner and supply and maintain adequate first-aid and fire-fighting equipment capable of extinguishing incipient fires. Comply with applicable local and state fire prevention regulations and, where the regulations do not cover, with applicable parts of the National Fire Prevention Standards for "Safeguarding Building Construction Operations," (NFPA 241).

END OF SECTION

TEMPORARY PLANT PROTECTION

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish all labor, materials, equipment, and services necessary for the installation of temporary fencing, barricades, and guards to protect trees and plants indicated to remain, as necessary and required to prevent damage above and below grade.

1.2 DEFINITIONS

A. Drip Line: Outer perimeter of branches of any tree or plant.

B. Ground Cover: Includes, but is not limited to, shrubs and grass.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Proposal for tree and plant protection, describing methods of protection and stabilization.

C. Drawings and supporting documentation as directed.

1.4 QUALITY ASSURANCE

A. Contractor's Condition Inspection: Include written report and digital images recording the condition of the site prior to commencing construction. Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1. Digital Images: Provide images in uncompressed JPEG format, produced by a digital camera with minimum sensor size of 10.0 megapixels, and at an image resolution of not less than 1600 by 1200 pixels.

1.5 PROJECT CONDITIONS

A. Performance Requirements: Prevent damage to trees and plants including soil, roots, bark, trunks, limbs, branches, and foliage due to construction activities including, but not limited to, the following:

1. Soil contamination, erosion, and compaction.

2. Excessive wetting, ponding of storm water, and construction run-off.

3. Alteration of grade and stockpiling of soil, debris, and materials.

4. Unauthorized cutting, breaking, skinning, and bruising of trees and plants.

B. Project Conditions: Install protection during initial mobilization at the site and maintain until Substantial Completion.

1. Driving and Parking: Not permitted within drip line of trees, plants and sensitive natural areas without Architect's written permission.

2. Storage of Materials and Debris: Not permitted within drip line of trees and plants.

3. Where Architect permits construction traffic, parking, or materials storage on prepared lawn and planting areas, provide planks, plywood and similar protection; prevent rutting, and compaction of soil.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXISTING TREES AND PLANTS

A. Water trees and plants as necessary to maintain existing condition throughout the Contract period until Substantial Completion.

B. Review conditions with Architect prior to pruning or cutting roots, branches and foliage, and proceed as directed by Architect. Perform pruning and cutting with sharp instruments intended for the purpose; do not break nor chop.

C. Maintain existing grades within drip line of trees and plants unless otherwise indicated or approved by the Architect.

3.2 REPAIR AND RESTORATION

A. Repair trees and plants damaged by construction operations as directed by the Architect. Make repairs promptly after damage occurs to prevent progressive deterioration.

B. Replace trees and plants damaged by construction operations where the Architect determines restoration to normal growth pattern is not possible. Plant and maintain as directed.

1. Trees up to 13-inch caliper: Same size as damaged tree; species selected by Architect.

2. Trees over 13-inch caliper: Compensate Owner as determined by an acceptable consulting arborist registered with the American Society of Consulting Arborists.

3. Plants: Same size, quality, and quantity as damaged; species selected by Architect.

END OF SECTION

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes delivering, handling, storing, and protecting products. Product selection and manufacturer's instructions. Product options and substitutions and sample substitution request form.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site:

1. Arrange deliveries of products in accordance with construction schedules, and deliver products in undamaged condition, in manufacturer's original packaging, with identifying labels.

2. Immediately after delivery, inspect shipments to ensure compliance with requirements of Contract Documents and ensure products are protected and undamaged.

B. Storage and Protection:

1. Materials shall be so stored as to ensure the preservation of their quality and fitness for the work. Maintain temperature and humidity within the ranges required by manufacturer's instructions. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground. Cover products which are subject to deterioration with vapor retarding coverings and provide adequate ventilation. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the Owner.

2. Protecting Products After Installation: Provide substantial temporary coverings as necessary to protect installed products from damage resulting from traffic and construction operations. Remove temporary coverings when no longer needed.

C. Handling:

1. Provide equipment and personnel to handle products and materials by methods which will prevent damage to products and materials.

2. Design, fabricate, assemble, and erect products, systems, and equipment in accordance with the best engineering and shop practices.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION

A. Comply with specified industry standards. If no standards are specified, comply with the product's industry standards as a minimum requirement. Provide materials in size, type, and quality indicated and specified, unless variations are accepted by Architect in writing.

B. Specifying a manufacturer and manufactured product shall not constitute a waiver of any requirements of the Contract Documents, and products furnished by the listed manufacturer shall conform to such requirements.

C. No materials or products containing asbestos are to be used in the construction of this Project. If any material or product specified in this Project Manual is known to contain asbestos, it shall be brought to the attention of the Architect before ordering or fabricating the material or product.

2.2 PRODUCT OPTIONS

A. For products specified only by reference standard, select any product meeting that standard.

B. For products specified by naming one or more products or manufacturers, Contractor must submit a request for substitution for any product or manufacturer not specifically named.

2.3 PRODUCT SUBSTITUTION PROCEDURES

A. Submit substitution requests on the CSI Substitution Request form bound in this Project Manual. If the Substitution Request form is reproduced, the terms and conditions of the Substitution Request bound in this Project Manual shall apply to the request.

B. Each substitution request shall include a complete description of the proposed substitute, the name of the material, service, or equipment for which it is to be substituted, drawings, cuts, performance and test data, samples illustrating color, texture and pattern, and any other data or information required to make a valid comparison. Product catalogs containing multiple products shall be marked to indicate which products and product options are being submitted for substitution. Substitution requests submitted with unmarked catalogs will not be reviewed. To have the results of a substitution request mailed to the author, include two copies of the substitution request form and a stamped, self-addressed envelope.

C. Consideration of Substitution Requests Prior to Bid Date: Submit Substitution Requests in accordance with Bidding Requirement Document "Instructions to Bidders." If, in the Architect's opinion, the proposed product is acceptable in lieu of the one or more specified, the Architect will include it in a written addendum which will be issued to bidders. Acceptance of a Substitution Request does not relieve the requestor from meeting the requirements, procedures, and warranties as set forth in this specification. Only those manufacturers, materials, services, and equipment approved in these Specifications or by Addendum will be acceptable for use on this construction project.

D. Consideration of Substitution Requests After Contract Award:

1. Requests for substitution of specified products after the construction Contract is signed, will be considered only in accordance with paragraphs 2.4.A. and 2.4.B., above. If, in the Architect's opinion, the proposed product is acceptable in lieu of the one or more specified, the Architect will issue a Supplemental Instruction, when Contract Sum or Contract Time is not affected, or a Construction Change Directive or Change Order, when Contract Sum or Contract Time is affected.

2. Substitution requests occasioned by the Contractor's failure to order specified material in a timely manner shall not be considered and delays in construction caused by such an event shall not be waived.

3. One or more of the following five conditions must also be documented:

   a. The substitution must be required for compliance with final interpretation of code requirements or insurance regulations.

   b. The substitution must be due to the unavailability of the specified products, through no fault of the Contractor.

   c. The substitution may be requested when subsequent information discloses the inability of the specified products to perform properly or to fit in the designated space.

   d. The substitution may be due to the manufacturer's or fabricator's refusal to certify or guarantee performance of the specified product as required.

   e. The substitution may be requested when it is clearly seen, in the judgment of the Architect, that a substitution, would be substantially to the Owner's best interests in terms of cost or time.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which material, equipment, and systems are to be fabricated, assembled, erected, installed, and applied. Correct existing conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected. Start of work will be interpreted as acceptance of existing surfaces and conditions within any particular work area.

3.2 INSTALLATION

A. Manufacturer's Instructions:

1. Perform work in accordance with manufacturer's printed fabrication, installation, and application instructions.

2. Obtain and distribute copies of manufacturer's printed fabrication, installation, and application instructions to parties involved in the construction, including two copies to Architect, and one copy at the site.

3. Handle, store, fabricate, erect, install, connect, apply, clean, condition, and adjust products, materials, systems, and equipment in accordance with manufacturer's printed instructions and in conformity with specified requirements.

4. Review and resolve conflicts between manufacturer's instructions and Contract Documents with Architect prior to fabrication, installation, and application of products, systems, and equipment.

B. Installation Procedure:

1. Require installer of each major unit of Work to inspect substrate to receive Work and conditions under which Work is to be performed. Installer shall report unsatisfactory conditions promptly in writing to Contractor. Remedy condition to installer's satisfaction immediately.

2. Inspect each item of material or equipment prior to installation. Reject damaged or defective items.

3. Provide attachment and connection devices and methods for securing Work. Secure Work true to line and level, and within recognized industry tolerances. Allow for expansion and building movement. Provide uniform joint width in exposed Work and arrange to provide best visual effect. Refer questionable visual effect choices to Architect.

4. Recheck measurements and dimensions of Work as integral step of starting each installation.

5. Schedule installation of each unit of Work to result in best overall compatibility to coordination of entire project. Isolate each unit of Work from incompatible work as necessary to prevent deterioration or damage. Coordinate enclosure of Work with required inspections and tests to minimize uncovering of Work for that purpose.

6. Where mounting heights are not indicated, use industry recognized standard heights for that unit of Work. Refer questionable issues to Architect for final direction.

END OF SECTION

SUBSTITUTION REQUEST

The Construction Specifications Institute
Northwest Region

TO: _____

PROJECT: _____

SPECIFIED ITEM:

Section No.	Page	Paragraph	Description

PROPOSED SUBSTITUTION: _____

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

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

Undersigned certifies that the 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 are available locally or are readily obtainable for proposed substitution.

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

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

Submitted by

_____
Name (Print)

_____
Signature

_____
Firm Name

_____
Address

_____
City, State, Zip

_____
Date

_____
Telephone Fax

_____
General Contractor (if after award of Contract)

For use by A/E:

____ Approved ____ Approved as Noted

____ Not Approved ____ Received Too Late

_____
By

_____
Date

_____
Remarks

Attachments

1999 Edition

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. General installation of products.

2. Progress cleaning.

3. Starting and adjusting.

4. Protection of installed construction.

5. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section "Project Management and Coordination" for procedures for coordinating construction activities.

2. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.

3. Division 1 Section "Closeout Procedures" for final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

a. Description of the Work.

b. List of detrimental conditions, including substrates.

c. List of unacceptable installation tolerances.

d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

4. Maintain minimum headroom clearance of 8-feet in spaces without a suspended ceiling.

EXECUTION

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.6 PROTECTION OF INSTALLED CONSTRUCTION

EXECUTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

1. Protect installed work from damage by construction operations.

2. Provide special protection where specified in individual specification sections.

3. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

4. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

5. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

6. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

7. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.7 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

CUTTING AND PATCHING

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor and materials necessary to execute cutting and patching of defective Work and areas of remodel where new construction joins existing finishes.

B. Match each patch material with kind, grade, size and quality identical to patched material.

C. Related Documents:

1. Design-Build Mechanical: Cutting and patching required exclusively for mechanical work.

2. Design-build Electrical: Cutting and patching required exclusively for electrical work.

1.2 CUTTING AND PATCHING DEFECTIVE WORK AND EXISTING FINISHES

A. Execute cutting, fitting, and patching of work required to remove and replace defective Work and Work not conforming to Contract Documents.

B. Inspect existing conditions of Work, including elements subject to movement or damage during cutting and patching.

C. Provide shoring, bracing and support as required to maintain structural integrity of the Project.

D. Execute cutting, product removal and patching by methods which will prevent damage to other Work, will provide proper surfaces to receive installation of repairs, and will comply with specified tolerances and finishes.

E. Cut lines that will be visible in completed work shall be straight and square to adjacent surfaces. Verify with Architect prior to cutting.

F. Repair surfaces adjacent to cut areas to match the adjacent finish.

G. Refinish exposed surfaces to natural breaks in the existing finished surfaces.

1.3 CUTTING AND PATCHING FOR SYSTEMS AND EQUIPMENT

A. Cut, fit, and patch building members to install equipment, systems, and sleeves.

B. Fill openings cut oversized to install equipment, systems, and sleeves until finished surface is tight against the penetrating material installed in the opening.

C. Do not penetrate spray-on fireproofing on steel members.

END OF SECTION

CONSTRUCTION WASTE MANAGEMENT

PART 1 GENERAL

1.1 SUMMARY

A. It is the intent of the Owner that, to the greatest extent practical, possible, and cost effective, waste generated during construction will be reused or recycled. In addition, all non-usable items or materials will be disposed of in the most environmentally sensitive manner as defined or approved by the Owner.

1.2 WASTE MANAGEMENT GOALS

A. Reuse or Recycle waste materials produced as a result of this Project in order to minimize the impact of construction waste on landfills and to minimize the expenditure of energy and cost in fabricating new materials.

B. Implement the Owner's waste management plan for Work performed on this Project. Outlined herein are examples of materials which can be reused or recycled.

1.3 WASTE MANAGEMENT PLAN

A. Reuse or recycle debris generated as a result of Work performed on the Project when practical and cost effective.

C. During the construction process and with the cooperation of the chosen hauler, report the following information on a monthly basis to the Owner:

1. Types of waste materials produced as a result of Work performed on site.

2. Quantities of waste and recyclables taken from the site.

3. Destination of materials.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 ON-SITE MATERIALS SORTING AND STORAGE DURING CONSTRUCTION

A. Each recycling facility and waste processor has requirements as to the way materials must be prepared to be accepted and to what degree materials can be contaminated. In most cases materials will need to be source-separated at the job site.

B. Work with a local hauler to provide separate containers for the following materials:

1. Wood.

2. Metals (ferrous and non-ferrous).

3. Cardboard.

4. Gypsum board.

5. Masonry and concrete.

6. Roofing.

7. Office paper.

8. Plastics.

9. Glass.

10. Carpet.

C. The above listed wastes are required to be recycled. Follow source-separation requirements for each waste and use the appropriate on-site container for each waste. Provide a separate container for nonrecyclable materials.

D. Rebates, if any, will be paid or credited by the hauler/recycler to the Contractor.

E. Inform field personnel and subcontractors about the recycling program and continuously monitor the program to verify proper source-separation to avoid contamination of the recyclable materials. Provide subcontractors, through the hauler, with on-site containers to facilitate recycling.

END OF SECTION

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes special procedures and Work described as part of project closeout, and a description of closeout submittals such as record drawings, operation manuals, and warranties.

B. Electronic Submittals: All submittal documentation and procedures detailed in this specification section that lend themselves to transfer by digital electronic media may be submitted in an electornic format as approved by the Architect.

C. Items to be Completed or Corrected: See paragraph 9.8.2 of the General Conditions of the Contract. Contractor inspects the Work and prepares a list of deficiencies for submittal to the Architect.

1.2 SYSTEM DESCRIPTION

A. When the Contractor considers the Work substantially complete, he shall submit to the Architect a written notice that the Work (or designated portion thereof) is substantially complete, together with a list of minor work to be completed or corrected. Within a reasonable time after receipt of this notice, the Architect will make an inspection to determine the actual status of completion.

B. Should the Architect determine that the work is in fact not substantially complete, he will promptly notify the Contractor in writing, giving the reasons. The Contractor shall remedy the deficiencies in the Work, and send a second written notice of Substantial Completion to the Architect.

D. When the Architect concurs that the Work is substantially complete, he will:

1. Notify the Owner of, and accompany the Owner on, an inspection of the Project.

2. Prepare a Certificate of Substantial Completion on AIA Form G704, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect and the Owner.

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

E. The Contractor will be allowed no longer than 30 calendar days from the date of Substantial Completion to request that the Architect make his final inspection for acceptance as final completion.

F. When the Contractor considers the Work complete, he shall submit a letter to the Architect stating that the Contract Documents have been reviewed, and that the Work has been inspected for compliance with Contract Documents.

1. Submission implies that the Contractor has, to the best of his knowledge, completed the Work in accordance with the Contract Documents, including "punch list" items, that equipment and systems have been tested in the presence of the Owner and are

operational, and that the Work is completed and ready for final inspection and for certificate of occupancy by the local code enforcement agency.

2. The Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of the Contractor's letter.

G. If the Architect considers the Work incomplete or defective, he will promptly notify the Contractor in writing, listing the incomplete or defective Work, and send a copy to the Owner. The Contractor shall then take immediate steps to remedy the stated deficiencies, and send second written notice indicating that the Work is complete, whereupon the Work will be reinspected. When the Project is determined to be acceptable under the Contract Documents, the Contractor may proceed with closeout submittals.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set of marked-up Record Prints. Architect will initial and date each print and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for organizing into sets, printing, binding, and final submittal.

b. Final Submittal: Submit one set of marked-up Record Prints, and one digital copy in PDF format.

B. Record Specifications: Submit one hard copy of Project's Specifications, including addenda and contract modifications, and one digital copy in PDF format

C. Record Product Data: Submit one copy of each Product Data submittal, including but not limited to paint colors, brands and types; manufacturer's names, styles and colors of all finish products.

1. Final Submittal: Submit one set of marked-up Record Product Data, and one digital copy in PDF format.

2. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

D. Evidence of compliance with requirements of governing authorities including the certificate of occupancy, and certain other certificates of inspection and use permits as required mechanical and electrical equipment.

E. Schedules and Reports: Finalized copies of schedules and reports submitted under Division 1 Section "Submittal Procedures."

F. Commissioning: Submit approved pre-functional checklists and functional performance testing reports from the commissioning documentation.

G. Operations and Maintenance Manuals:

1. Submit one copy of operations and maintenance manuals to the Commissioning Authority for review concurrent with review by Architect and Owner.

2. Operation instructions and maintenance data, including maintenance personnel instructions, service manuals, and specifications, to be bound in black 3-ring binders, indexed with dividers, for a legible, permanent reference. Submit three copies of instruction books which shall include the following information:

a. Binder covers with title "Operations and Maintenance Manuals," the title of the Project, and subject matter of the binder when multiple binders are used.

b. Name, address, and phone number of the firm/person who installed the equipment or system.

c. Name, address, and phone number of the nearest service facility authorized by the manufacturer.

d. Complete technical information, such as electrical and mechanical schematics, diagrams, parts lists, data sheets, connection details, and similar data.

e. Operating instructions such as start up procedures, inspection and maintenance routines.

f. If standard product literature covers more than one model type, the correct model number and data for the item installed shall be neatly checked off in ink.

g. If the system or equipment is unique, custom written information shall be provided.

h. The Commissioning Authority is responsible to compile, organize and index all commissioning data into labeled and indexed three-ring binders for delivery to the Owner. The manual summarizes all of the tasks, findings, and documentation of the commissioning process. The report addresses the actual performance of the building systems in reference to the design intent and contract documents.

H. All warranties and bonds.

I. Keys and keying schedule.

J. Spare parts and extra stock.

K. Evidence of payment, release of liens and final wage certificates.

L. Certificate of insurance for products and completed operations.

M. Final payment and release of retainage will be withheld until all closeout submittals have been received and approved by the Owner.

1.4 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

B. Commissioning Authority Review:

1. Prior to substantial completion, the Commissioning Authority (CA) reviews the O&M mauals for systems that were commissioned. The manuals are reviewed for completeness and for adherence to the requirements of the specifications. The CA will communicate deficiencies in the manuals to the Owner.

2. Materials may be added, or requested from the Contractors and design/build contractors, to stress and enhance the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. This work does not supercede the Architect and Owner's review of the O&M manuals.

3. The commissioning requirements of Division 1 Section “General Commissioning Requirements” must be complete prior to final acceptance, unless approved in writing by the Owner. Exceptions to this are any required seasonal or approved deferred testing.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Schedule as many training sessions as necessary with the maintenance personnel prior to any occupancy of the building. Cover topics such as system start-up, operation, and maintenance procedures. Training sessions shall be conducted by the appropriate subcontractors, with assistance from the Contractor.

3.2 DEMONSTRATION AND TRAINING DVD’S

A. General: Engage a qualified commercial photographer to record demonstration and training DVD’s. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

C. Narration: Describe scenes on videotape by dubbing audio narration off-site after DVD is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

3.3 CLEANING

A. Remove clearing and demolition debris, excess construction materials, and construction equipment.

B. Floors and Pavements:

1. Interior floors and pavements shall be vacuum cleaned or swept with a hair push broom.

2. All exterior floors, pavements, and decks shall be swept clean with a heavy fiber push broom or power sweeper.

C. Finished building surfaces and appurtenances shall be clean, free from labels, stains, and soil of all kinds wherever located.

D. Hardware shall have paint and dirt marks removed. It shall be polished and in perfect operation and adjustment.

E. Glass and plastics shall be clean and polished, with all labels removed. Fixtures and equipment shall be clean and in perfect operation and adjustment.

END OF SECTION

COMMISSIONING

PART 1 GENERAL

1.1 SUMMARY

A. Commissioning refers to a quality management process that is to be applied to certain systems and equipment identified herein.

B. Commissioning includes, but is not limited to, performance of the following in accordance with requirements of the Contract Documents:

1. Installation, Checkout, Startup, and Pre-functional Checks.

2. Functional Testing of operational modes.

3. Adjustments to ensure optimal performance with respect to system and equipment longevity, occupant comfort, energy efficiency, and ease of maintenance.

4. Training of facility operating staff and building occupants.

1.2 RELATED SECTIONS

1. Section 23 08 00, Commissioning for HVAC

2. Section 26 08 00, Commissioning for Electrical

3. Commissioned Systems and Equipment: The following systems and equipment commissioned as described in this Section:

4. HVAC Systems and Equipment

5. Lighting Controls

6. SUBMITTALS

B. Submit the following for commissioned systems and equipment:

1. Installation, Checkout and Startup documentation.

2. Completed Prefunctional Checklists.

3. Review of Draft Functional Test Plans.

4. Executed preliminary Functional Test Plans, executed by the Contractor in preparation for final Functional Testing.

5. Written certification, prior to start of final Functional Testing, that commissioned systems and equipment are fully operational and operating in accordance with requirements of the Contract Documents.

6. Trend Logs

7. Facility Operating Staff and Building Occupants Training Plan

C. Include the Commissioning Agent in the submittal and submittal review process required by other Sections of this Specification for commissioned systems and equipment.

1.3 COMMISSIONING SCOPE OF WORK - COMMISSIONING AGENT

A. The Commissioning Agent will be engaged by the Owner under a separate contract. PAE Consulting Engineers Inc. will act as the Commissioning Agent.

B. The duties of the Commissioning Agent are:

1. Develop a Commissioning Plan to facilitate the execution of the commissioning process as specified herein. The Commissioning Plan will be a summary document and is not intended to include additional work not already described in the Contract Documents. In the case of discrepancies, the Contract Documents prevail. Include the following elements:

a. Commissioning process overview, including goals and objectives.

b. Directory of personnel involved in the commissioning process.

c. Description of roles and responsibilities for personnel.

d. Description of the commissioning process, including meetings, site observations, progress reporting and logs, required submittals, execution and documentation of systems and equipment startup, including Prefunctional Checklists, execution and documentation of systems and equipment functional testing, including Functional Test Plans, Trend Logs, procedures for handling deficiencies or non-conformance issues, facility operating staff participation, and additional seasonal testing requirements.

e. Commissioning process schedule, based on Contractor's construction schedule.

2. Facilitate a Commissioning Kick-off Meeting to review the Commissioning Plan with the Owner, Contractor, Architect, and subconsultants.

3. Prepare Prefunctional Checklist Templates for commissioned systems and equipment. The Prefunctional Checklist Templates are attached to the end of this Section.

4. Prepare Functional Test Plans, and Trend Log descriptions, for commissioned systems and equipment.

5. Attend construction meetings with the Contractor, Architect, Sub-consultants, and Owner as required to give input to the commissioning process.

6. Issue periodic Commissioning Progress Reports, Commissioning Issues Logs and related documents to track the progress of the commissioning process.

7. Review Contractor's submittals for commissioned systems and equipment.

8. Perform periodic site observations of the ongoing installation of commissioned systems and equipment.

9. Witness selected pre-functional check out and startup of commissioned systems and equipment.

10. Review Prefunctional Checklists completed by the Contractor.

11. Observe and review results of Functional Testing executed by the Contractor.

12. Review Trend Logs prepared by the Contractor.

13. Review Contractor's training plan for facility operating staff and building occupants. Verify Contractor's execution of plan.

14. Prepare a final Commissioning Report upon completion of the commissioning process.

1.4 COMMISSIONING SCOPE OF WORK - CONTRACTOR

A. Assign qualified personnel representing involved trades to participate in each element of the commissioning process.

B. Incorporate the commissioning process and related activities into the construction schedule.

C. Keep the Owner, Architect, and Commissioning Agent updated on the schedule for activities involved in and impacting the commissioning process.

D. Submittals required for the commissioning process are noted above. In addition, include the Commissioning Agent in the submittal process required by other Sections of this Specification for commissioned systems and equipment.

E. Hold a Commissioning Kick-off Meeting and periodic commissioning meetings or incorporate commissioning into the agenda of periodic construction meetings.

F. Review and comment on the Commissioning Plan, noting exceptions taken.

G. Review and respond to periodic Commissioning Progress Reports, Commissioning Issues Logs and related documents issued by the Commissioning Agent to track the progress of the commissioning process.

H. Provide test equipment and related services required for the commissioning process, as described below.

I. Prepare Prefunctional Checklists for commissioned systems and equipment using the Prefunctional Checklist templates provided herein.

J. Complete the Prefunctional Checklists for commissioned systems and equipment.

K. Perform Functional Testing of commissioned systems and equipment, including Trend Logs and deferred Functional Tests.

L. Keep the Commissioning Agent informed of the process of Training of Facility Operating Staff and Building Occupants.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. Provide testing and data logging equipment, tools, instruments, and software required to perform installation, checkout, startup, completion of Prefunctional Checklists, execution of Functional Testing and creation of Trend Logs for the systems and equipment being commissioned. Include required software set-up services required to achieve fully functional testing and data logging equipment.

B. Sufficient quality and accuracy to test and/or measure system and equipment performance within the tolerances specified in the Contract Documents. If not otherwise noted, the following minimum requirements apply:

1. Temperature sensors and digital thermometers have a certified calibration to NIST traceable standards within the past year to an accuracy of 0.5 degrees F and a resolution of ±0.1 degrees F.

2. Pressure Sensors: Accuracy of ±2.0 percent of the value range being measured (not full range of meter) and have been calibrated within the last year.

3. Water Flow Meters: Accuracy of ±2.0 percent of the value range being measured (not full range of meter) and have been calibrated within the last year.

4. Airflow Meters: Accuracy of ±3.0 percent of the value range being measured (not full range of meter) and have been calibrated within the last year.

5. Dew Point Sensors: Certified calibration within the past year to an accuracy of ±1 degrees F dp and a resolution of ±0.1 degrees F dp.

6. Relative Humidity Sensors: Certified calibration within the past year to an accuracy of ±2 percent RH and a resolution of ±1 percent RH.

7. CO_2 Sensors: Certified calibration within the past year to an accuracy of ±50 ppm and a resolution of ±1 ppm.

8. VOC Sensors: Certified calibration within the past year to an accuracy of ±50 ppm and a resolution of ±1 ppm.

9. CO Sensors: Certified calibration within the past year to an accuracy of ±50 ppm and a resolution of ±1 ppm.

10. Calibrate equipment according to the manufacturer’s recommended intervals and recalibrated when dropped or otherwise damaged.

11. Affix and date calibration tags or certificates made readily available.

PART 3 EXECUTION

3.1 MEETINGS

A. Commissioning Kickoff Meeting:

1. Within 30 days of Notice to Proceed, hold this meeting to be co-facilitated with the Commissioning Agent.

2. Attendees include the Owner, Architect and subconsultants and Contractor.

3. Commissioning Agent will present the Commissioning Plan and the commissioning process, including goals and objectives, assignment of personnel, roles and responsibilities, submittals, process tracking documentation, and schedule of major milestones.

B. Commissioning Meetings:

1. Hold periodic meetings, which may be incorporated into other construction meetings, to review the progress of the commissioning process, address issues, and schedule future activities.

2. Attendees include the Owner, Architect and subconsultants (as necessary), Commissioning Agent, and Contractor.

3.2 INSTALLATION, CHECK-OUT, STARTUP AND PREFUNCTIONAL CHECKS

A. Requirements for installation, check out and startup of commissioned systems and equipment are described in other parts of the Contract Documents.

B. Installation, Check Out and Startup Documentation:

1. Use manufacturer’s documentation for installation, check-out, and startup of commissioned systems and equipment to prepare the Prefunctional Checklists, using the templates provided herein.

C. Prefunctional Checklists:

1. Prepare Prefunctional Checklists for commissioned systems and equipment.

2. The purpose of these is to document proper completion of installation, check-out, and startup work.

D. Notify the Commissioning Agent in advance to allow observation of systems and equipment installation, check-out and startup, as well as completion of the Prefunctional Checklists.

E. Complete the prefunctional checklists clearly identify outstanding issues. Check off each item on the checklist by an individual with direct knowledge of the successful completion of that item.

F. Sensor Calibration:

1. Calibrate sensors, which may include, temperature, relative humidity, CO, CO2, refrigerant, O2, and/or pressure sensors and gages.

2. Factory installed sensors need not be field calibrated, provided certification of proper calibration is provided.

3. Verify that locations are appropriate and away from causes of erratic operation.

a. Sensor Calibration Methods:

(1) Sensors:

(a) Verify that sensor locations are appropriate and away from causes of erratic operation.

(b) Make a reading with a calibrated test instrument within six inches of the sensor site.

(c) Calibrate sensor to within tolerances indicated below, or to within manufacturer's recommended tolerance, whichever is more stringent.

(d) Verify that sensors with shielded cables, are grounded only at one end.

(e) Sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2 degrees F of each other for temperature and within a tolerance equal to 2 percent of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.

(2) Tolerances, Standard Applications:

Sensor	Required Tolerance (+/-)
Cooling Coil, Chilled and Condenser Water Temperatures	0.5 degrees F
AHU Wet Bulb or Dew Point	2.0 degrees F
Hot Water Coil and Boiler Water Temperature	1.5 degrees F
Outside Air, Space Air, Duct Air Temperatures	0.5 degrees F
Watthour, Voltage and Amperage	1 percent of design
Pressures, Air, Water and Gas	3 percent of design
Flow Rates, Air	10 percent of design
Flow Rates, Water	4 percent of design
Relative Humidity	4 percent of design
Combustion Flue Temperatures	5.0 degrees F
Oxygen monitor CO2 Monitor	0.1 percent pts 0.1 percent pts
CO Monitor	0.01 percent pts
Natural Gas and Oil Flow Rate	1 percent of design
Steam Flow Rate	3 percent of design
Barometric Pressure	0.1 in. of Hg

(3) Actuator Calibration:

(a) Calibrate actuators (dampers and valves) on equipment.

(b) Factory installed actuators need not be field calibrated, provided certification of proper calibration is provided.

(c) Valve and damper actuator positions checked, verify the actual position against the control signal. Command valve or damper closed, visually verify that valve or damper is closed, and adjust output signal as required.

(d) Command valve or damper open, verify position is full open, and adjust output signal as required. Three intermediate positions. Replace actuator if actual valve or damper position does not reasonably correspond.

3.3 FUNCTIONAL TESTING

A. Functional Test Plans:

1. Design to test operational modes of the systems or equipment to verify compliance with the specified Sequence of Operations and ensure optimal performance with respect to system and equipment longevity, occupant comfort, energy efficiency and ease of maintenance. Functional Test Plans will be provided by the Commissioning Agent.

B. Review of Draft Functional Test Plans:

1. Review the Draft Functional Test Plans with respect to specified capabilities, feasibility, safety, system, and equipment damage protection, building damage protection, and warranty issues.

2. Submit written notification to the Commissioning Agent of concerns.

C. Preliminary Functional Testing:

1. Execute the Functional Test Plans and submit completed Functional Test Plans to the Commissioning Agent to demonstrate that commissioned systems and equipment are fully operational and operating in accordance with requirements of the Contract Documents.

D. The following occurs before final Functional Testing begins:

1. Completed execution, submittal, and review of the Prefunctional Checklists.

2. Completed punch list items.

3. Completed execution, submittal, and review of testing and balancing for air and water systems.

4. Check out and calibrate controls.

5. Contractor review of Functional Test Plans.

6. Execute the Functional Test Plans in advance of final Functional Testing

7. Submit written certification that commissioned systems and equipment are fully operational and operating in accordance with requirements of the Contract Documents.

E. Final Functional Testing:

1. Perform initial functional testing on consecutive workdays within a single work week.

2. Execute Functional Test Plans in the presence of the Commissioning Agent.

3. Operate systems and equipment during Functional Testing and responsible for resultant damage that may occur to systems or equipment.

4. Record results of Functional Testing.

F. Functional Tests:

1. Subject to scheduling and seasonal constraints, each test performed under the actual conditions under which the systems and equipment were designed to function.

2. Provide necessary labor, materials, equipment, system modifications, and services required to create the conditions necessary to execute each test according to the Functional Test Plans.

3. At completion of the test, return affected equipment and systems to their approved operating settings.

G. Functional Testing Strategies:

1. The following strategies may be used to test the reaction of systems or equipment to a given set of conditions:

a. Alteration of setpoints.

b. Overriding sensor input values to simulate a condition.

c. Manual override of equipment or system conditions.

d. Simulating a condition using a signal generator.

H. Optimization:

1. During Functional Testing, make adjustments to ensure optimal performance with respect to system and equipment longevity, occupant comfort, energy efficiency, and ease of maintenance and other factors based on performance observations and recommendations of the Commissioning Agent.

I. Statistical Sampling:

1. Multiple identical pieces of equipment with identical application and sequence of operation may be Functionally Tested using a sampling strategy, subject to the discretion of the Commissioning Agent.

2. Additional sampling may be required, depending on observed performance and failure rate.

J. Trend Logs:

1. Once Functional Testing has been completed for commissioned systems and equipment, create Trend Logs as described in the Functional Test Plans.

2. Include a description of required data Trend Logs, including identification of data points, frequency of sampling, length of trending period.

3. Submit Trend Logs in Microsoft Excel files. Provide adequate information to identify data, including key to abbreviated point names, data units, and graphic diagrams of system and equipment sufficient to determine locations of sensors.

4. Review the Trend Logs and determine whether additional testing is required.

5. Schedule and perform additional testing without impact to the construction schedule.

K. Non-Conformance:

1. Commissioning Agent will identify instances of non-conformance with the Contract Documents and track the status (PASS/FAIL) and the nature of the non-conformance for each of the commissioned systems and equipment.

2. Corrections of minor deficiencies identified may be made during testing at the discretion of the Commissioning Agent.

3. Make necessary corrections and schedule a repeat of the test without impact to the construction schedule.

L. Retesting:

1. Only one series of retesting will be permitted, and performed on consecutive workdays within a single work week.

2. Compensate the Commissioning Agent for expenses for additional retesting in the event of continued non-conformance at PAE Consulting Engineers, Inc. standard billing rates.

M. Deferred Testing:

1. Functional Testing may be deferred at the discretion of the Commissioning Agent in the event that appropriate conditions do not exist to perform reliable testing.

2. Typical conditions that may require deferral include peak building occupancy or seasonal weather patterns.

3. Perform deferred Functional Tests during the warranty period to complete Functional Testing of commissioned systems and equipment.

4. Revise project record documentation such as Record Drawings, Record Specifications and Operation and Maintenance Manuals or other documents to reflect changes that occur during deferred Functional Testing.

3.4 TRAINING OF FACILITY OPERATING STAFF AND BUILDING OCCUPANTS

A. Training of facility operating staff and building occupants specified in other Sections of this Specification is subject to the observation and review of the Commissioning Agent.

B. Submit a detailed Training Plan for review of the Commissioning Agent prior to beginning training.

C. Training Plan includes a description of each training session, including topics, attendees, instructor(s), methods, location, duration, and schedule.

D. Training not to begin until Functional Testing has been successfully completed.

END OF SECTION

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Furnish labor, material and equipment required for the partial demolition and removal of pavement, interior walls, ceilings, and other material as required preparatory to remodeling.

B. Scope of demolition and removal work is shown on the Drawings.

1.2 PROJECT CONDITIONS

A. Existing Conditions: Verify existing conditions at the site and include all work evident by site inspection whether or not shown on the Drawings. Include demolition that is implied or consequential to other trades to achieve the intended results.

C. Notify the Architect in advance of cutting or alteration which may affect the structural safety of any portion of the project.

D. All material and debris resulting from demolition Work, unless specifically designated for reuse or to be turned over to the Owner, shall become property of the Contractor and be removed from the site at Contractor's expense.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect the work to determine condition of existing building and amount of existing materials and debris to be removed. Remove debris from the site as demolition progresses and do not allow to accumulate on the premises.

3.2 PREPARATION AND COORDINATION

A. Utilities: Coordinate demolition work with affected electrical and mechanical crafts. Completely remove all existing utility services which are not a part of new work or designated to remain. Save and protect existing utilities shown to remain. Notify Architect at once if unknown utilities are found in the work.

B. Laws and Ordinances: Comply with the applicable laws and ordinances governing the disposal of debris on or off the site, and commit no trespass on any public or private property in any operation due to or connected with demolition.

3.3 DEMOLITION PROTECTION

A. Existing Facilities: Protect adjacent walkways, building entries, and other building facilities during demolition operations.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during demolition and cleaned and reinstalled in their original locations after demolition operations are complete.

C. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until installation.

4. Protect items from damage during transport and storage.

5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

6. The following items shall be salvaged for reuse:

a. Brick cleaned of all mortar..

b. Fire extinguisher cabinets and portable fire extinguishers.

D. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner.

2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner.

E. Temporary Protection: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise from portions of the building that are outside the scope of this Project.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated portions of existing building as detailed. Include demolition that is implied or consequential to other trades to achieve the intended results. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

2. Maintain adequate ventilation when using cutting torches.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

3.6 HAZARDOUS MATERIAL ABATEMENT

A. The areas designated for demolition shall have hazardous materials abated by other contractors outside the scope of this contract prior to starting the scope of this contract.

B. If during the course of the demolition work, the Contractor observes or suspects the existence of hazardous material in the building, the Contractor shall immediately stop work in that area and promptly notify the Owner. Coordinate with the Owner the removal of hazardous material by other contractors so as not to delay the Work.

END OF SECTION

CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the construction of formwork for cast-in-place concrete, coordinating setting of inserts, and other work to be installed before forms are closed; and removal of forms.

B. Related Section: Division 3 Sections “Reinforcing Steel,” and “Cast-In-Place Concrete.”

1.2 REFERENCES

A. American Concrete Institute (ACI). Unless noted otherwise, all references to ACI documents shall conform to current building code adopted section or most current section if not adopted by current building code.

B. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

C. APA The Engineered Wood Association.

1.1 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Detail Drawings: Formwork detail drawings conforming to ACI 318. Detail drawings shall show location of cast-in-place elements in the work including form board layout, reveals, cold joints, and form ties in wall elevations in sufficient detail to cover fabrication, placement, stripping, and finishing.

C. Product Data: Manufacturer’s standard product data. Data that includes multiple products shall be marked to show product being supplied.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Plywood Form Faces:

1. Structural Concrete: Coated and sealed APA B-B Plyform Class 1, Ext. PS 1-83. Maintain panels clean, recoated, and in like new condition for each reuse.

B. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.

2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.

C. Inserts and Embedded Items: Pressure-preservative treated "Std. & Btr." fir for wood nailers and rough bucks. Schedule 40 PVC or ABS plastic pipe sleeves or poly-foam blocks wherever pipes or conduits pass through concrete work.

D. Form Coatings:

1. Mineral spirit base form release agent. Verify compatibility with subsequent applied finishes and moisture protective coating systems as specified. Use no form oil.

2. Manufacturers:

a. Cresset Chemical "Crete-Lease 880-VOC."

b. Dayton Superior "Clean Strip J100 VOC."

c. Masons Supply Company “Mascokote VOC.”

E. Chamfer Strip:

1. Radius corners, match existing radius.

2. Manufacturer: Greenstreak.

PART 3 EXECUTION

3.1 CONSTRUCTION OF FORMWORK

A. Construct forms according to the recommended practices as outlined in ACI "Form Work for Concrete," Special Publication No. 4, and ACI 347. Be prepared to submit loading data, if requested, on any system chosen for use. Design, strength, and safety are the responsibility of the Contractor. Manufacturer’s instructions of pre-engineered forming systems shall take precedence over conflicting requirements of this specification.

B. Construct forms to maintain slopes, lines, and dimensions shown and be straight, plumb, and sufficiently tight to prevent leakage.

C. Securely brace and shore forms to prevent displacement, carry construction loads and safely support the concrete without distortion until set.

D. Use metal form ties manufactured for this purpose throughout. Wood separators and twisted wire tying will not be permitted.

E. Wet down or treat forms before pouring. Remove forms only when concrete is sufficiently hard and will not be damaged by removal, and the concrete has attained sufficient strength to ensure structural stability, carry dead loads and any construction loads which may be imposed upon it.

END OF SECTION

REINFORCING STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, welding, materials, equipment, and services necessary for the installation of reinforcing steel.

B. The General Structural Notes shall be used in conjunction with these specifications. The General Structural Notes shall supersede items in this specification when discrepancies exist.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. American Welding Society (AWS).

C. Concrete Reinforcing Steel Institute (CRSI).

D. American Concrete Institute (ACI). Unless noted otherwise, all references to ACI documents shall conform to current building code adopted section or most current section if not adopted by current building code.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Placing drawings and bar lists showing quantities, sizes, dimensions, bends, applicable details, spacing of bars, and location of splices. Submit rebar detail drawings conforming to ACI SP-66. The steel reinforcement detailer shall generate all shop drawing bending and installation details from the structural and architectural drawings and specifications. The use of reproductions or photocopies of the contract drawings shall not be permitted.

C. Steel shall be marked and identified when it arrives at the project. Provide mill certificates for each lot and make available to Architect upon request.

PART 2 PRODUCTS

2.1 MATERIALS

A. Unless noted on the Drawings, all reinforcing steel shall conform to ASTM A615 Grade 60 or ASTM A706 Grade 60.

B. Bar and rod mats for concrete reinforcement conforming to ASTM A184.

C. Cold drawn wire reinforcement conforming to ASTM 82.

D. Plain smooth dowels and 1/4-inch diameter smooth bars conforming to ASTM A615 Grade 60.

E. Tie wire shall be 16 gauge or heavier black annealed wire.

F. Welded wire fabric electrically welded, gauge and mesh size as detailed, conforming to ASTM A1064.

G. Bar supports shall conform to the CRSI Manual of Standard Practice, Chapter 3, Bar Supports.

H. Reinforcing bars to be embedded in concrete shall be free from oil, loose mill scale and rust. Reinforcing bars with rust, mill scale or a combination of both will not be acceptable without cleaning or brushing provided that upon wire brushing a sample, the dimensions including height of deformations and weights shall not be less than the applicable ASTM requirements.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) – Manual of Standard Practice, ACI SP-66 – ACI Detailing Manual, and ACI 318.

B. Welding of reinforcement is not permitted unless otherwise noted on the Drawings.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.1 INSTALLATION

A. Details of concrete reinforcement not covered in the Drawings and these Specifications shall be in accordance with the CRSI Manual of Standard Practice.

B. Reinforcing bars shall conform accurately to the dimensions detailed and be within the standard fabricating tolerances.

C. Unless otherwise noted on the Drawings, bend all hooks using the pin diameters and dimensions detailed as ACI Standard Hooks.

D. Do not bend or straighten reinforcing bars in a manner that will injure the material.

E. Place bars in conformance with the CRSI Manual of Standard Practice.

F. Securely tie bars to prevent displacement during the pouring operation. Wire dowels in place before depositing concrete.

G. Install reinforcing bar splices as detailed.

H. Minimum Clear Thickness of Concrete Over Bars:

1. 3 inches at earth formed or surfaces bearing on earth.

2. 1-1/2-inches at walls exposed to earth and weather with #5 and smaller reinforcing bars. 2-inches at walls exposed to earth and weather with #6 and larger reinforcing bars.

I. Welding of reinforcing bars only as approved by the Architect shall be performed in accordance with AWS D1.4, Structural Welding Code - Reinforcing Steel, ASTM A706 Grade 60.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections: The Owner will employ the services of an independent testing laboratory to conduct inspection services on all reinforcing steel placement.

END OF SECTION

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of cast-in-place concrete, including mixing, delivery and placement; curing; and tests, reports, and records of inspection as required.

B. The General Structural Notes shall be used in conjunction with these specifications. The General Structural Notes shall supersede items in this specification when discrepancies exist.

C. Related Sections:

1. Division 3 Sections “Concrete Forming and Accessories,” and “Reinforcing Steel.”

2. Division 32 Sections “Concrete Paving.”

1.2 REFERENCES

A. American Concrete Institute (ACI). Unless noted otherwise, all references to ACI documents shall conform to current building code adopted section or most current section if not adopted by current building code.

B. American Society for Testing and Materials (ASTM).

1. ASTM C33, Standard Specification for Concrete Aggregates.

2. ASTM C39, Standard Specification for Ready-Mix Concrete.

3. ASTM C143, Test for Slump of Portland Cement Concrete.

4. ASTM C150, Standard Specification for Portland Cement.

5. ASTM C494, Standard Specification for Chemical Admixtures for Concrete.

6. ASTM C685, Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Manufacturer’s printed product data of concrete additives clearly marked to indicate selected products.

C. Mix designs for all specified mixes, 14 days before any concrete placement, including manufacturer’s product data for all admixtures and amounts per yard. Submittals shall conform with ACI 318, Chapter 5, requirements for mix designs. Sample standard deviation shall be calculated per ACI 318 section 5.3.1.1 or 5.3.1.2. Documentation of average compressive strength shall also be submitted and approved per ACI 318-11 section 5.3.3.1.

D. Copies of laboratory test reports on the compressive strength of test cylinders made with each mix proposed for use.

E. Copies of certificates prepared by the concrete supplier stating that the approved additives were added to each batch of concrete delivered to the site. Certificates shall also state, if applicable, amount of water which was withheld at the batch plant for inclusion at the site. Each certificate accompanied by one copy of each batch delivery ticket indicating the trade name, manufacturer's name, and amount per cubic yard of material added.

1.4 QUALITY ASSURANCE

A. Perform all work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

E. Review special inspection and testing and inspecting agency procedures for field quality control.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I, low alkali for all concrete Work.

1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33.

1. Acquire aggregates for entire project from same source.

2. Maximum Size: 1 inch and not more than 1/5 of narrowest dimension between sides of forms, 1/3 depth of flatwork, or 3/4 of narrowest space between reinforcing bars. Reference General Structural Notes for maximum aggregate size based upon use.

C. Water: ASTM C1602, clean and not detrimental to concrete. Do not add water to mix at project site unless letter from concrete supplier is obtained documenting amount of water withheld from mix to be added at project site.

D. Admixtures:

1. All admixtures produced by the same manufacturer to ensure compatibility of the products. Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete or as indicated within the drawings or specifications. Do not use calcium chloride or admixtures containing calcium chloride.

2. Water Reducing Admixture:

a. ASTM C494, Type A. All concrete shall contain a Type A admixture in the basic design with dosages high enough to reduce water by at least 10% from the same mix without the admixture. This admixture shall produce no retardation.

b. Products:

(1) "Zyla 630" by Grace Construction Products.

(2) "Polyheed" by Master Builders.

3. Accelerating Admixture:

a. ASTM C494, Type E. Do not use chloride in its manufacture. Use of this product is Contractor's option.

b. Products:

(1) "Daraset" by Grace Construction Products.

(2) "Pozzutec 20" by Master Builders.

4. Retarding Admixture:

a. ASTM C494, Type D. Do not use retarder without the Architect's approval. Submit written proposed details of use.

b. Products:

(1) "Daratard-17" by Grace Construction Products.

(2) "Pozzolith 100 XR" by Master Builders.

E. Fly Ash and Slag:

1. May be used at Contractor's option to replace up to 20% of cement content, provided the mix design strength is substantiated by test data.

2. Fly ash: Conform to ASTM C618, including Table 24, Class F.

3. Slag: Ground granulated blast furnace slag (slag cement) conforming to ASTM C-989 and AASHTO M-302, Grade 100.

F. CUR-1, Curing Compound:

1. ASTM C309, Type 1. One coat application at coverage rate of 200 s.f./gallon.

2. Products:

a. "Masterkure 200W" water base curing compound by Degussa Building Systems.

b. "VOCOMP-20" by W.R. Meadows.

c. "Hydro Cure 309" by Unitex.

d. "Conspec RX Cure WB" by Dayton Superior.

2.3 CONCRETE MIX DESIGN

A. Contractor's Option:

1. Before ordering concrete, submit four copies of previously used and tested design mixes meeting the requirements of ACI 301, using aggregates, admixtures, and cement/fly ash intended for use in this concrete, to Architect for review and approval for use in this Work.

2. Laboratory designed mix strength used as a basis for selecting proportions of ingredients for concrete exceeds the minimum specified design strength by the amount required by ACI 301, but not less than 500 psi. Comply with ACI 211.1 recommendations.

B. Show dry weight of cement, fly ash, saturated-surface-dry weights of fine and coarse aggregate, quantities of admixtures, W/C ratio, slump, air content, and the unit weight per cubic yard of concrete. Submit a separate design mix for each design mix number required in this Work.

C. Manufacturer is fully responsible for the selection of proportions for the concrete mix, ASTM C94 and ACI 301.

D. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 and in accordance with the following:

1. Compressive Strength: Refer to General Structural Notes.

2. Maximum Water-Cementitious Materials Ratio: Refer to General Structural Notes.

3. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having the air content specified in the General Structural Notes.

A. Limit water-soluable, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

PART 3 EXECUTION

3.1 CONCRETE MIXING

A. Ready-Mixed Concrete:

1. Use only ready-mixed concrete obtained from plant approved by the Architect, mixed and delivered in conformance with the approved design mix. Obtain a delivery ticket for each batch of concrete delivered to the job.

2. Maintain a file of all delivery tickets at the job site, in good order, available for inspection by Architect at all times. Include the following information: Name of ready-mix batch plant; serial number of ticket; date and truck number; Contractor's name; job name, and location (address); amount of concrete in batch (cubic yards); mix type number; location placing on job; and name, quantity and type of admixtures.

B. Add all ingredients to the concrete at the batch plant during the mixing time. This includes all cement, fly ash, aggregate, water, and admixtures.

C. Do not add water to the concrete mix at the Project Site unless it is specifically noted on the batch ticket that water was withheld at the batch plant for inclusion at the Project Site. The special inspector shall approve any water addition at the Project Site.

D. Mix concrete in strict accordance with admixture manufacturer's instructions and recommendations for uniform and complete distribution.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

B. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 CONCRETE PLACEMENT

A. Place concrete in accordance with ACI 304R.

B. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

C. Thoroughly soak wood forms or coat with release compound before pouring concrete. Dampen earth bottoms to reduce moisture loss from concrete.

D. Deposit concrete as near to the final position as possible to avoid rehandling or movement by vibrators. Insert the vibrator within 2 feet of the point of placement as the concrete is being placed. Place the concrete in uniform, horizontal layers not exceeding 24 inches in height after consolidation. Avoid vertical joints or inclined planes. The piling up of concrete in forms in such a manner as to permit the mortar to escape or to necessitate the lateral flow of the concrete will not be permitted. Deposit concrete continuously and as rapidly as practical until the entire unit of pour is completed.

E. Transit Mixers: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 degrees F., reduce mixing and delivery time from 90 minutes to 75 minutes; when air temperature is above 90 deg. F., reduce mixing and delivery to 60 minutes.

F. Provide hoppers and elephant trunks to place concrete.

G. Concrete placed in ambient temperatures of 50°F down to 40°F may be treated with the specified accelerating admixture. Do not add calcium chloride to the concrete.

3.4 COMPACTION

A. Concrete may be placed as flowable concrete at Contractor's option (6-inch slump with admixtures). Flowable concrete requires only 1/4 of the vibration of 3-inch to 4-inch slump concrete.

B. Vibrate all concrete, or work by hand where vibration cannot be used to assure close contact with all surfaces of the forms and reinforcement, and leveled off at proper grade to receive finish. Vibrate for sufficient duration to accomplish thorough compaction and complete embedment of reinforcement but not long enough to cause separation of the mix.

C. The vibrator shall be either motor-in-head type with 180 cycle generators or 2-1/2 h.p. motor-on-shaft type with length not exceeding 12 feet. Motor-in-head units with 60-cycle power or similar sources will not be used. The vibrator is subject to approval of the Architect. 10,000 impulses per minute minimum frequency. Be thoroughly familiarized with all requirements and discussion of the vibrator selection included in ACI 309, Consolidation of Concrete. General use of vibrators for this construction shall have heads from 2-1/4 inches to 2-5/8 inches in diameter and 16-inches in length.

D. Top out all concrete with a lesser powered vibrator, not to exceed 12 inches in length, to remove air pockets from the top portion of the casting. This will be done only after the other compaction is completed. The specified high-energy vibrators have a tendency to churn air into the top of the concrete. In no case will the vibrator be allowed to be partially exposed from the concrete surface. When partial exposure occurs, the vibrator will be immediately extracted.

3.5 PROTECTION AND CURING

A. Comply with the requirements of ACI 308.1.

B. Protect concrete finishes against injury from the elements and defacements of any nature during construction operation.

C. Curing: Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Begin final curing immediately following initial curing and before concrete has dried, and continue for seven days. Conform to ACI 308 and the following.

D. Keep all unformed and exposed surfaces of footing pads continuously moist for at least seven days. Keep wood forms wet during curing period. Moist-cure formed work as forms are removed during curing period.

3.6 MANUFACTURER'S FIELD SERVICE

A. Provide the services of a qualified technical representative of the product manufacturer to instruct the concrete supplier in proper batching and mixing of materials for admixtures.

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Use ACI Standard Specification for Structural Concrete for Buildings, ACI 301 for all concrete Work. Inspect placing and condition of reinforcing before placing concrete.

2. The Owner will employ the services of an Independent Testing Laboratory (ITL) for taking of tests and to conduct inspection services. Cooperate with the Testing Laboratory and provide storage for shipping boxes, cylinder molds, and assist in storage and shipping of cylinders. Reference requirements of structural drawings and Statement of Special Inspections within the structural drawings for all required inspections and testing in addition to this specification.

3. Give Architect and testing laboratory 24 hours advance notice before starting work requiring inspections and tests.

4. Inspection includes placing and finishing of concrete Work to ensure workmanship, control of materials and compliance with the Specifications.

5. For each day's pour of each concrete mixture, make four standard 6-in by 12-in compression test cylinders for testing complying with ASTM C31 and obtained according to ASTM C172. Test one at seven days, one pair at 28 days, and one "hold cylinder" on every 150-cu.yd. of concrete or 5000-sf of surface area for slabs and walls placed or each day's pour if less than 150-cu.yd. Compression test cylinders will not be required for minor non-structural pours of less than 10-cu.yd. per day if prior approval of Architect is obtained.

6. A slump, air content, and unit weight test will be made when cylinders are taken. Contractor shall maintain a slump test cone on the site at all times for intermittent slump tests as requested.

7. Concrete in pours which do not attain the specified strength may be rejected and must be replaced if so ordered.

8. Submit ITL written reports on all tests and inspections made, to the Architect, ready-mix producer, and other offices as directed by the Architect.

9. Evaluation of Test Results: If the results of this testing show that any part of the structure contains material which is below the requirements called for by these Specifications, that portion of the Work will be subject to condemnation by the Architect. Remove and replace any Work so condemned by the Architect as directed by the Architect.

10. Load and Core Tests: Make load tests per ACI 318, core tests and such other tests as the Architect may deem necessary, at Contractor's expense for the following reasons:

    a. Average 28-day strength of any pair of test cylinders more than 500 psi below design strength.

    b. Average 28-day strength of three consecutive pair of test cylinders below design strength.

    c. Evidence of uncured frozen concrete.

END OF SECTION

HYDRAULIC CEMENT UNDERLAYMENT

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of hydraulic-cement-based, polymer-modified, self-leveling underlayment for application below interior floor coverings.

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1, Section "Submittal Procedures."

B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

C. Qualification Data: For qualified Installer.

D. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

E. Minutes of preinstallation conference.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Installer with commercial experience who is approved by manufacturer for application of underlayment products required for this Project.

B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.

C. Fire-Resistance Ratings: Where indicated, provide hydraulic-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2. The hydraulic cement underlayment shall be installed over the entire floor to maintain the intergrity of the fire-rated assembly.

D. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

B. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

1.6 COORDINATION

A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, specified in Division 9 Sections, to ensure compatibility of products.

PART 2 PRODUCTS

2.1 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS

A. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/4 inch (6 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ardex; K-15 Self-Leveling Underlayment Concrete.

b. BASF Construction Chemicals, Inc.; Chemrex Self-Leveling Underlayment.

c. CGM, Incorporated; PRO S.L.U. Self-Leveling Underlayment.

d. Dayton Superior Corporation; LeveLayer.

e. Euclid Chemical Company (The); TAMMS SLU.

f. L&M Construction Chemicals, Inc.; Levelex.

g. Lambert Corporation; Lambco L-16 Self-Level.

h. Maxxon Corporation; Level-Right.

i. RAECO, Inc.; S.L.U.

j. Specialty Construction Brands, Inc., an H.B. Fuller company; TEC EZ Level.

k. Teck Specialties; Teck 2800.

l. USG Corporation; Levelrock SLC 400.

m. US SPEC, Division of US Mix Products Company; US SPEC Self-Leveling Underlayment.

2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.

3. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

B. Aggregate: Well-graded, washed coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 deg F.

D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.

B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.

1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.

2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.

3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply underlayment to produce uniform, level surface.

1. Apply a final layer without aggregate to product surface.

2. Feather edges to match adjacent floor elevations.

D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

BRICK MASONRY UNITS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of salvaged brick masonry units.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Brick Institute of America (BIA), Technical Notes on Brick Construction.

C. Oregon Masonry Guild.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

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

1. Cementitious materials. Include brand, type, and name of manufacturer.

2. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

3. Grout mixes. Include description of type and proportions of ingredients.

4. Anchors, ties, and metal accessories.

C. Mortar color samples.

1.4 QUALITY ASSURANCE

A. Masonry veneer anchorage shall comply with “OSSC 2014 section 2101.2.6 Masonry Veneer” which states masonry veneer shall comply with the provisions of Chapter 14 or Chapter 6 of ACI 530/ASCE 5/TMS 402. This requirement supersedes any conflicting requirements of this specification.

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

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep bagged materials dry, protected from weather damage and with complete labels and identification on wrappings. Store aggregates in bins or piles on platforms out of mud and water, sheltered from weather. Remove and discard all damaged and contaminated material.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed in Paragraph 2.2, Materials.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Face Brick: Undamaged salvaged brick.

B. Mortar: ASTM C270, Type S, 1800 psi.

1. Lime: ASTM C207, Type S hydrated lime.

2. Cement: ASTM C150, Type I, light color.

3. Sand: Masons Sand, ASTM C144.

4. Color: Non-fading mortar color, to match existing mortar color.

a. Manufacturers: Davis Colors; L.M. Scofield Co.

C. Brick Anchors:

1. Hot dip galvanized steel adjustable ties, 3/16-inch diameter wire by the length necessary to anchor in mortar joint a minimum of 2-inches. 1/4-inch diameter wire ties required for cavity space 2-inches or more between back face of brick and structural support.

2. Brick Anchor Accessories: Hohmann & Barnard adjustable wire veneer and back up anchors.

a. Frame Wall: HB-213-2X with X-SEAL Tape.

b. Seismic Reinforcing: HB Seismiclip Interlock System, and ASTM A641 Class 3 mill galvanized continuous 0.148-inch diameter wire (W1.7) at each anchor location.

3. Fasteners:

a. Wood Screws: ASME B18.6.1.

b. Type S-12 screws, bugle or pan head as required, ASTM C954.

D. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods, ASTM A951.

1. Walls: Hot-dip galvanized, carbon steel.

2. Wire Size for Side Rods: 0.148-inch diameter (9 ga.).

3. Wire Size for Cross Rods: 0.148-inch diameter (9 ga.).

4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.

5. Provide in lengths of not less than 10 feet.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces supporting or joining masonry work, and report unsatisfactory conditions to Architect for decision. Starting work indicates acceptance of surfaces by the Contractor.

3.2 INSTALLATION

A. All work shall be performed in an accurate manner by mechanics skilled in laying masonry units. All items laid true and plumb with joints in perfect alignment.

B. Measure materials accurately for each batch in conformance with approved mix design. Mix for at least five minutes in a mechanical batch mixer. Hand mixing not permitted without specific approval of Architect. Use all mortar and grout within 2-1/2 hours after initial mixing and discard sooner than 2-1/2 hours if set has begun.

C. Lintels: Install hot-dip galvanized steel lintels over all openings. Build to details on Drawings. Minimum 4-inches bearing at each end.

D. Brick Anchors:

1. Provide approved anchors in compliance with IBC and not less than one per each 2 s.f. of wall area and at not over 32-inches o.c. horizontal and 18-inches o.c. vertical spacing. At vertical expansion and isolation joints and at openings larger than 16” in the shortest direction: provide additional anchors along each edge at 36” o.c. max. and 12” max. from edges. Install anchors in second course above and below ledger angles.

2. Ties shall slope down and out not over 10° from horizontal, to divert water to outside, be of proper size for each installation and kept 5/8-inch minimum back of exposed masonry face:

a. At wood framing, anchor ties with No. 10 x 2-inch galvanized screws through sheathing and into solid framing.

E. Building-In and Setting Other Work: Locate accurately by dimension or template built-in anchors, accessories, and work of other trades where installed in or supported by masonry.

F. Masonry Bond and Joints:

1. Pre-wet brick to control rate of suction at time of laying to not exceed 0.025 oz./sq.in.

2. Use standard running bond with all stretcher units unless otherwise detailed or required at cavity walls. Maintain regular modular dimensions horizontally and vertically with coursing as detailed. Cut all face units where required to maintain regular pattern except no units less than half a brick long without approval.

3. Lay units with full head and bed joints and units shoved into place. Fully embed both surfaces of flashing in mortar within joints. Tool and compact exposed face joints to give concave rodded finish.

4. Stop-off horizontal runs of masonry by racking back half a unit length in each course or in accordance with special pattern bonds. Re-lay units in fresh mortar that are moved or shifted after mortar has stiffened.

5. Remove mortar stains with clean water as work progresses.

6. Upon completion of work, clean all exposed surfaces using methods and procedures as recommended by the Structural Clay Products Institute, the Oregon Masonry Guild, and the brick manufacturer.

3.3 CLEANING

A. Remove waste and excess material from site. Do not dump excess mortar and wash from mixer on the site. Leave grounds, pavements, and building areas clean.

END OF SECTION

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Examine Drawings for required items and furnish in sizes, number, and kind to complete the Work.

B. The General Structural Notes shall be used in conjunction with these specifications. The General Structural Notes shall supersede items in this specification when discrepancies exist.

C. Shop fabricate miscellaneous steel, including brackets, railings, angles, anchors, supports, and other items as detailed for support or connection of other Work.

D. Furnish items to other trades when setting and installation is part of their Work.

1.2 REFERENCES

A. American Institute of Steel Construction (AISC).

B. American Society for Testing and Materials (ASTM).

C. The Society for Protective Coatings (SSPC).

D. National Association of Corrosion Engineers International (NACE International).

E. International Code Council (ICC).

F. Occupational Safety and Health Administration (OSHA).

G. International Building Code (IBC).

H. American Welding Society (AWS).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Shop drawings showing dimensioned details of all components. Cross-reference shop drawing details to detail numbers on the Drawings to facilitate checking.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. For all bidder design Contractor delegated designs noted within the Drawings, provide a design with drawings and calculations stamped by a registered engineer in the State of Oregon.

1.4 QUALITY ASSURANCE

A. Handrails and guardrails shall conform to OSHA standards and IBC requirements.

B. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code – Steel."

2. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

A. Field Measurements:

1. Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed in Paragraph 2.2, Materials.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. The following is a list of items needed for the construction of the building as specified and constitutes a description of the type of materials necessary to fabricate such items. However, it does not preclude that each individual item on the job is herein listed. It is the responsibility of this Section to completely furnish all items as detailed.

1. Lintels: ASTM A36, standard rolled shapes and sections fabricated to sizes and dimensions as detailed.

2. Fasteners: Provide zinc-coated fasteners with galvanizing complying with ASTM A 153 or stainless steel as noted on drawings and elsewhere in the specifications. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items. Fasteners to be as follows:

   a. Lag Bolts: ANSI B18.2.1

   b. Standard Bolts: Steel bolts complying with ASTM A 307, Grade A, with ASTM A 563 hex nuts and flat washers.

   c. High Strength Bolts: ASTM A325, regular hexagon head

   d. Nuts: ASTM A563

   e. Washers: Under head and nut in all wood connections. ASTM F844 with A307 bolts, ASTM F436 with A325 bolts

   f. Finish: Furnish hot-dip galvanized finish when installed with galvanized items.

3. Threaded Concrete Anchors:

   a. Description: Zinc plate finish, interior use only.

   b. Manufacturers: "Titen HD" by Simpson Strong-Tie, Inc., “Kwik HUS-EZ” by Hilti.

4. Expansion Anchors for fastening to concrete:

   a. ICC approved, zinc plate finish.

   b. Manufacturers: “Kwik Bolt TZ” by Hilti, “ Trubolt+” by ITW Red Head, “Strong-Bolt 2” by Simpson Strong-Tie.

5. Handrails and Guardrails: 1-1/2-inches o.d., ERW or DOM round mechanical tubing, 0.156-inch wall thickness, for general areas fabricated as detailed. Other sizes as noted. All connections penetration welded using back-up sleeve welding connectors, include end returns to wall and closure plates on open ends. All welds ground smooth and flush. Furnish complete with all fittings, brackets, sleeves and hardware required for installation.

6. Cold Galvanizing Repair Compound: ZRC Worldwide “Galvilite,” silvery-finish, 95% zinc in dry film using Type III ultra-pure ASTM D520 zinc (lead and cadmium free). Exceeds Fed. Spec DOD-P-21035A.

2.3 FABRICATION

A. Examine Drawings for required items and furnish in sizes, number and kind to complete the Work.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

C. Form metal work to required shapes and sizes, with true curves, lines and angles. Provide components in sizes and profiles indicated, but not less than required to comply with requirements indicated for structural performance or, if not indicated, to comply with requirements of authorities having jurisdiction and with structural properties to sustain safety or withstand loads to which normally subjected.

D. Allow for thermal movement resulting from a maximum change (range) in ambient temperature of 100°F, in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and night time sky heat loss. Provide necessary rebates, lugs, and brackets for assembly of units. For Work exposed to view, use concealed fasteners unless indicated as exposed fasteners or welded joints, or unless otherwise indicated on final shop drawings.

E. Cut shapes to pattern, sizes, and dimensions as detailed and approved. Punch and drill holes accurately, maintaining proper edge and end clearance and proper diameter to fit each fastening. Countersink holes for flat head wood screws.

F. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

G. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

H. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

I. Furnish and shop assemble all items true to measurements taken at the job, disassembled and ship to the job, complete with all sleeves, bolts, etc., necessary for erection.

J. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

K. Mark each member or assembly of members with erection marks for identification; furnish an erection diagram with marks as detailed. Ship assembled units in such a manner that they may be transported and unloaded without being excessively stressed, deformed or otherwise damaged. Place fabricated material on skids, off the ground; keep clean and properly drained.

L. All welding performed by AWS certified welders and in accordance with AWS D1.1. Perform welding, brazing, and soldering such that surface exposed to view in completed Work will be free of pitting, runs, spatter, cracks, warping, dimpling, depressions, distortion, discoloration and other imperfections. Grind exposed welds to match adjacent finish. Welds shall not be visible on finished surface.

M. Grind exposed ends and cut edge of all items smooth and slightly beveled to remove sharpness, burrs, and cutting marks. Use gas cutting torch in the field to cut holes or correct fabrication errors only after submitting each condition to Architect for review.

N. Fabrication tolerance for flat surface shall be ±1/32-inch in 2-feet measured in every direction at any location with no evidence of oil canning.

O. Separate dissimilar metals fabricated under this Section and metals of this Section that contact metals of other construction with separator recommended by fabricator to prevent corrosion and galvanic action. Do not extend coating onto exposed surfaces.

2.4 STEEL FINISHES

A. Hot-dip galvanized finish per ASTM A123, Coating Grade 75 for all steel and iron items exposed in exterior locations, and elsewhere as called on the Drawings. One shop coat rust inhibiting primer paint on all other items whether concealed or exposed, except do not prime surfaces to be bonded into concrete, at friction type connections or surfaces within 2-inches of bolts or welds.

PART 3 EXECUTION

3.1 ERECTION

A. Furnish items to other trades when setting and installation is part of their Work.

B. Do not set permanent bolting or welding until as much of the assembly as will be stiffened thereby has been properly aligned and within tolerances.

C. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

D. Set steel elements accurately to the lines and elevations indicated. Align and adjust the various members before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. At completion of erection, grind exposed welds smooth, touch-up paint field bolts and welds and abrasions with the same paint used for shop painting or galvanized repair paint on galvanized items.

END OF SECTION

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of all rough carpentry.

B. The General Structural Notes shall be used in conjunction with these specifications. The General Structural Notes shall supersede items in this specification when discrepancies exist.

1.2 REFERENCES

A. American Institute of Timber Construction (AITC).

B. American Lumber Standards Committee (ALSC).

C. American National Standards Institute (ANSI).

D. American Society for Testing and Materials (ASTM).

E. American Wood Preservers' Association (AWPA).

F. APA - The Engineered Wood Association.

G. International Code Council (ICC).

H. Voluntary Product Standard (PS).

I. West Coast Lumber Inspection Bureau (WCLIB).

J. American Forest and Paper Association (AF&PA).

K. Western Wood Products Association (WWPA).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Composite wood manufacturer certification of compliance with requirement for no added urea-formaldehyde resins in composite wood products.

C. Shop drawings of the following building components:

1. Glue-laminated beams.

a. Indicate species and laminating combinations, adhesive type, and other variables required in work.

b. Include large-scale details of connections.

D. Certificate of Conformance with Attachments 1 and 2 indicating compliance with AITC or APA requirements.

E. Certification of conformance to treated lumber requirements.

1.4 QUALITY ASSURANCE

A. Materials shall be grade stamped equal to or better than the grades hereinafter called for according to the following associations governing their various species of lumber products:

1. American Institute of Timber Construction (AITC).

2. APA - The Engineered Wood Association.

3. Unless otherwise noted, moisture content of material shall conform to WCLIB Rule No. 16, General Grading Provisions, Paragraph 3, Seasoning Provisions.

B. Treated Lumber: Inspection of material for conformity to the requirements of this specification shall be in accordance with AWPA Standard M2, Standard for Inspection of Treated Timber Products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Wrap, cover, and protect lumber products in shipment and while stored on site to prevent weather exposure and damage. Maintain stocks neat and in good order, level and off ground or floors, raised on pallets or dunnage to prevent contact with water.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate with Division 7 Section "Modified Bituminous Membrane Roofing" for installation of roof insulation stops and sleepers, and plywood decking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed in Paragraph 2.2, Materials.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Framing Lumber:

1. Structural Light Framing: WWPA No. 2, kiln dried, Douglas-fir/larch.

2. Beams and Stringers: WWPA No. 1, kiln dried, Douglas-fir/larch.

3. Posts and Timbers: WWPA No. 1, kiln dried, Douglas-fir/larch.

B. Treated Lumber:

1. Decay Resistance-Treated Lumber: No. 2 S4S Douglas-fir, shall be pressure-treated with ammoniacal copper quaternary (ACQ) or copper azole (CA) in accordance with AWPA Standard U1, minimum Use Category UC2. All pressure-treated lumber shall bear the AWPA Use Category quality mark. Lumber marked "treatment to point of refusal" is not acceptable.

a. ACQ Products: "Nature Wood" by Osmose, 800/241-0240; "ACQ Preserve" by Chemical Specialties, Inc., 800/421-8661. Do not use in contact with single ply roof membranes.

b. CA Products: "Natural Select" by Arch Wood Protection, Inc., 866/789-4567.

C. Subfloor, Wall Sheathing and Roof Sheathing: Structural-Use panels of all-veneer, Group 1, APA Rated Sheathing, Exposure 1, C-D, thickness as detailed, span rating to match support spacing. Roof sheathing under singly ply membrane roofing shall be minimum 5/8-inch thick plywood.

D. Roof sheathing under singly ply membrane roofing shall be minimum 5/8-inch thick plywood.

E. Plywood Underlayment: 1/2-inch thick, Group 1, APA Exposure 1, Underlayment Grade plywood, UL FR-S label.

F. Underlayment Nails: Six penny (6d) ring shank nails.

G. Plywood for Equipment Boards: 3/4-inch thick APA Group 1, C-D, UL FR-S label.

H. Glue-Laminated Beams:

1. Lumber for laminating shall meet the Structural Requirements of Laminating Specifications, Voluntary Product Standard PS56, for Structural Glue Laminated Timber, and AITC 117. Stress Grades of beams to provide glue-laminated members with allowable values as detailed. All members fabricated with waterproof adhesive, camber as noted, and in conformance with ANSI A190.1.

2. Beams in concealed spaces shall be Industrial Appearance Classification.

3. End seal all members and protect in transit and against weather and construction stains by individually wrapping each member. Protect and clean all exposed surfaces scheduled for transparent finish.

I. Separation Felt: Fortifiber “Aquabar B,” grade B building paper.

J. Anchor Bolts: ASTM F1554, Grade 36, American made machine thread cut bolts, 5/8-inch full diameter, 10-inches long unless noted otherwise on Drawings, with 2-inch hooked end, complete with nut and washer.

K. Framing Connectors:

1. ICC approved stock framing connectors, G90 galvanized ASTM A653, (G185 galvanized ASTM A653 or Type 304 stainless steel in contact with treated lumber), rated according to recorded tests. Provide special framing anchor nails as required and other fastenings as detailed and normal for installation.

2. Manufacturers: K.C. Metals "Superspeed Connectors," Silver, and Simpson Strong Tie.

L. Fasteners:

1. Power-Driven Fasteners: NES NER-272.

2. Lag Bolts: ASME B18.2.1.

3. Nails, Brads, and Staples: ASTM F 1667.

4. Wood Screws: ASME B18.6.1.

5. Type S-12 screws, bugle or pan head as required, ASTM C954.

6. Bolts: Steel bolts complying with ASTM A 307, Grade A, with ASTM A 563 hex nuts and, where indicated, flat washers.

7. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

a. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

b. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2, for use with treated lumber.

M. Fasteners for Treated Lumber: Type 304 stainless steel in contact with decay-resistant treated lumber or fire-resistant treated lumber.

N. Construction Adhesive:

1. Water dispersed industrial adhesive.

2. Manufacturers: 3M Co. "Scotch-Grip" 1357.

PART 3 EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions.

D. Do not splice structural members between supports, unless otherwise indicated.

E. Selection and placement of exposed wood products: All wood products designed to be left exposed to view in the completed building shall be selected for good appearance, free of wanes, heartwood, pitch pockets, splintering, checking, banding indentations, grade stamps, and other defacements.

F. Cut and repair framing where required by electrical, mechanical or other mechanics throughout the job. Boring of holes for pipes and conduits not included. Where cutting is required in a structural member that is likely to weaken the construction, consult with the Architect as to the measures taken in order to perform the work without causing any deficiencies of strength or workmanship. Close all openings with incombustible material where pipes and ducts pass through framing.

G. Accurately fit all connections as detailed, all bolt holes drilled and properly sized to the bolts. Predrill lag and wood screw holes. Washers required under head and nut of all wood connections.

H. Nailers, Cants and Crickets: Include rough carpentry as detailed and specified for installation of roofing and miscellaneous nailers. Use pressure-preservative-treated lumber throughout. Build wood framed curbs and nailers for support and anchoring of flashing and equipment as detailed. Permanently attach to roof deck, walls, or other structural substrate with approved fasteners, two or more fasteners per member and spaced at not over 36-inches o.c. Securely nail all splices, laps and built-up members.

I. Sills and Plates: Use pressure-preservative-treated sills and plates in all conditions where bearing on concrete. Double top plate on all partitions with end joints lapped and staggered. Reinforce top plates where cut for electrical and mechanical work with 16 gauge metal splice plates.

J. Studs, Caps and Headers: Use straight material throughout; twisted material not permitted. Set all items as necessary for rigid frame.

K. Headers: Install over all openings. Fabricate from two or more members on edge with shims as required, spike solidly together. Install stud and cripple minimum at each rough jamb. Minimum schedule unless otherwise noted on Drawings.

1. Up to 4-feet inclusive: Two 2 x 6.

2. 4-feet to 6-feet inclusive: Two 2 x 8.

3. 6-feet to 8-feet inclusive: Two 2 x 10.

4. Over 8-feet: As detailed.

L. Beams: Install in locations as detailed, anchoring solidly. Stay and brace members in position until all connections are complete. Handle and protect specially wrapped or prepared items to avoid damage or scarring.

M. Firestops and Blocking:

1. Install as detailed and in no case more than 120-inches apart vertically and horizontally, in exterior and interior wood stud walls throughout. Fire block at ceiling line where wall finish does not continue above ceiling.

N. Wood Contacting Concrete: Wherever joists, beams, rafters, etc., make end or side contact against concrete walls and slabs, install two layers of 30 lb. roofing felt so there will be no contact between wood and concrete.

O. Treated Wood Contacting Metal: Wherever decay-resistant treated wood comes in contact with any type of metal, install one layer of 30 lb. roofing felt so there will be no contact between wood and metal.

P. Subfloor, Wall Sheathing and Roof Sheathing Structural-Use Panels:

1. Secure sheathing panels with nail size and pattern as detailed. Lay panels with face grain perpendicular to the supports with joints in adjacent panels staggered and butted at center line of joists.

2. Apply 1/4-inch diameter continuous bead of construction adhesive to tops of joists, blocking, and plates immediately prior to placing subfloor panels.

3. Install subfloor panels with 1/8-inch space between sheets and clearance at boundary walls and rigid penetrations through floor.

4. Provide blocking or "Ply-Clips" at unsupported edges of roof sheathing as detailed and whenever framing is spaced more than 16-inches o.c. Install with plugged face up.

Q. Equipment Boards: Secure equipment mounting boards 8-inches o.c. at each stud, "C" face exposed.

R. Underlayment:

1. Lay building paper over subfloor, fastening in place with staples driven flush. Install treated underlayment over building paper with staggered panel joints so that the four corners of the underlayment do not meet directly over the corners or joints of the subfloor.

2. Nail with six penny (6d) ring shank nails spaced no more than 8-inches o.c. at the panel edges and at 8-inches each way throughout the body of the panel. Nails shall not penetrate framing. Adjust nail spacing to meet finish floor material manufacturer's requirements if more stringent.

S. Blocking and Backing: Verify that solid blocking or backing is provided in framing for attachment of all wall and ceiling mounted items and equipment. Coordinate specific blocking

requirements of all items specified in each specification Section that mount on walls and ceilings. Use templates and fastening devices furnished with item or appropriate screws and bolts. Check Hardware Schedule for locations of wall-mounted door bumpers. Do not fasten solely to wall and ceiling finish materials.

T. Deflection Head Construction: Required at the top of all non-bearing wall partitions that occur under open-web type framing members. Allow 3/4-inch space between top plate of wall and bottom truss chord for deflection tolerance.

U. Fasteners in Withdrawal: Non-structural wood components held in place with fasteners that would be in withdrawal loading after the final assembly is complete shall be fastened with bugle head screws with the same frequency as scheduled for nails. Screws shall be minimum length to penetrate substrate 1-1/2-inches.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections: The Owner will employ the services of an independent testing laboratory for conducting inspection services on plywood nailing and as noted within the Statement of Special Inspections on the Structural Drawings.

END OF SECTION

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of finish carpentry such as trim and molding.

B. Related Sections:

1. Division 6 Section “Architectural Woodwork.”

2. Division 9 Section “Painting” for finishing of wood products.

1.2 REFERENCES

A. Architectural Woodwork Quality Standards (AWS): Architectural Woodwork Standards, Guide Specifications and Quality Certification Program, Edition 1, adopted and published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada and The Woodwork Institute.

B. APA - The Engineered Wood Association.

C. National Hardwood Lumber Association (NHLA).

D. Voluntary Product Standard (PS).

E. Western Wood Products Association (WWPA).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings showing details and profiles of all special molding and other special run millwork.

1.4 QUALITY ASSURANCE

A. Quality Grade: Unless otherwise specified, perform work and provide products in accordance with AWI/AWMAC/WI Architectural Woodwork Standard (AWS), Custom Grade.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Single Source Responsibility: Provide and install this work from single fabricator.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection: Protect finish materials from dirt and moisture during delivery and while stored on the job. Store at site in a protected dry area with heat and ventilation as required to

keep lumber dry. Do interior work only in areas where wet work has been completed and work area is dry, heated and ventilated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed in Paragraph 2.2.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. WB-1, Softwood Wall Base: 1 x 6 WWPA Finish Grade (graded one face and two edges) “Superior” hemlock, kiln dried, paint finish.

B. WB-2 Hardwood Wall Base: 1 x 6 National Hardwood Lumber Association (NHLA) FAS (firsts and seconds) maple with clear finish to match Architect’s sample.

C. Softwood Door and Relite Frames, and Trim: WWPA Finish Grade (graded one face and two edges) “Superior,” hemlock, kiln dried, paint finish.

D. WD, Hardwood for wall paneling, door frames and trim:

1. Grade: National Hardwood Lumber Association (NHLA) FAS (firsts and seconds).

2. WD-1, Material: Oak to match existing adjacent wood, clear finish.

3. WD-2, Material: Maple to match Architect’s sanple, clear finish.

E. High Pressure Laminate: 0.050 grade NEMA Type I wall covering at janitor sinks (including cap, cove, and corner moldings for all edges and corners).

1. Colors: Refer to Finish Material legend.

F. Moisture Content: Kiln dry finish lumber and molding to 15% maximum moisture content.

G. Nails: Finish nails for all face nailing. Use nail size as required for material and in lengths necessary to penetrate solid framing.

H. Adhesive: Marsh, Miracle Adhesive, 3M Co., or U.S. Plywood Weldwood.

PART 3 EXECUTION

3.1 INSTALLATION

A. Workmanship: Work to AWS Custom Grade standards throughout. Vertical grain on exposed principal face of all members as directed by Architect. Finish sand all work and leave smooth

and dirt free, without blemishes visible through finishes as scheduled. Remove and replace or resurface all work showing hammer marks, splits, tool marks, torn grain, and other appearance of defective workmanship as directed by Architect.

B. Cutting, Fitting and Jointing: Install standing and running trim and boards in one-piece continuous lengths wherever practical with no spliced piece less than 6-feet long. Scarf end splices and make inconspicuous, with end grains matched if work is transparent finished. Miter outside intersecting corners of trim and molding, cope inside corners. Miter and return at exposed ends of trim to conceal end grain.

C. Nailing: Set heads for putty stopping.

D. Install plastic laminate wall covering using adhesives and methods approved by plastic laminate manufacturer. Install matching color edge trim on exposed edges.

3.2 INSTALLATION OF SPECIALTY ITEMS

A. Verify that solid blocking is provided in framing for attachment of wall and ceiling mounted specialty items and equipment. Use templates and fastening devices furnished with item or appropriate screws and bolts. Do not fasten solely to wall and ceiling finish materials.

END OF SECTION

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes but is not necessarily limited to the following architectural millwork:

1. Wood paneling at walls.

2. Plastic laminate and wood veneer casework.

3. Solid surfacing.

B. Related Section: Division 13 Section “Bullet Resistant Fiberglass” for lining casework privacy panels.

1.2 REQUIREMENT OF REGULATORY AGENCIES

A. Comply with all national, state and local codes including:

1. Building codes.

2. Environmental codes.

3. Fire codes: Where required by code, all materials must be fire rated. Except for enclosed exitways and corridors, a Class C interior finish (76 to 200 flame spread) is required. In corridors, Class B interior finish (26 to 75 flame spread) is required.

4. Codes of any other regulatory agency having jurisdiction.

1.3 REFERENCES

A. Standards: The following referenced standards and standard specifications, referred to thereafter by designation only, form a part of this Section.

1. American National Standards Institute (ANSI):

a. ANSI A208.1-1987, Mat-Formed Wood Particleboard.

b. ANSI A208.2-1980, Medium Density Fiberboard for Interior Use.

c. ANSI/AHA A135.4-1982, Basic Hardboard.

2. American Society for Testing and Materials (ASTM):

a. D523-89, Test Method for Specular Gloss.

b. D2898-81 (1986), Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.

c. E84-89a, Test Method for Surface Burning Characteristics of Building Materials.

3. Architectural Woodwork Quality Standards (AWS): Architectural Woodwork Standards, Guide Specifications and Quality Certification Program, Edition 1, adopted and published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada and The Woodwork Institute.

4. National Particleboard Association (NPA):

   a. NPA 8-86, Voluntary Standard for Formaldehyde Emission from Particleboard.

   b. NPA 9-87, Voluntary Standard for Formaldehyde Emission from Medium Density Fiberboard (MDF).

5. National Electrical Manufacturers Association (NEMA): NEMA LD 3-91, Application, Fabrication, and Installation of High-Pressure Decorative Laminates.

6. Hardwood Plywood and Veneer Association (HPVA): ANSI/HPVA HP-1-2009, American National Standard for Hardwood and Decorative Plywood.

7. National Hardwood Lumber Association (NHLA).

8. U.S. Voluntary Product Standard (PS): U.S. Voluntary Product Standard PS 1-83, Construction and Industrial Plywood.

9. Western Wood Products Association (WWPA).

1.4 DEFINITIONS

A. Exposed Surfaces: Surfaces visible when doors and drawers are closed; bottoms of casework more than 4-feet above finished floor, backs of hinged doors and edges of hinged doors exposed when opened, visible surfaces of open shelving and surfaces behind glass doors.

B. Semi-Exposed Surfaces: Surfaces that become visible when drawers and doors are opened, tops of cases 6-feet, 6-inches or more above finished floor.

C. Concealed Surfaces: Surfaces not visible after installation.

1.5 SUBMITTALS

A. Submit the following in accordance Division 1 Section “Submittal Procedures.”

B. Product Data:

1. Include catalog cuts for cabinet hardware and other equipment.

2. Provide samples for hinges, catches, door/drawer pulls, and cabinet locks.

C. Shop Drawings:

1. Submit shop drawings of woodwork showing location of each item, dimensioned plans and elevations, grain direction, large scale details, joints, sections and connections to adjacent work.

2. Include details of framing, blocking and furring and coordination for interface work at substrates.

3. Include hardware schedule for cabinet hardware.

D. Samples:

1. Paneling: 18-inch square x full depth corner samples with typical reveal detail for each required profile.

2. Stained and transparent finished samples: Submit two sample sets for each species, showing full range of grain, color, texture and finish.

3. Plastic laminate finished samples: Submit 4-inch x 4-inch of each pattern specified.

4. Provide one sample cabinet of each cabinet type, showing typical joint conditions, fabrication methods, quality of door and drawer hardware, and quality of finishes and workmanship.

E. Composite wood manufacturer certification of compliance with requirement for no added urea-formaldehyde resins in composite wood products.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm with at least 5 years experience in successfully producing architectural woodwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Single-Source Manufacturing and Installation Responsibility: Engage a qualified manufacturer to assume undivided responsibility for woodwork specified in this Section, including fabrication, finishing, and installation.

C. Grade of Architectural Woodwork: Conform to AWS "Custom Grade" standards for material, fabrication and installation.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Storage: Storage areas shall be clean and the relative humidity held steady within 25% to 55%.

1.8 PROJECT CONDITIONS

A. Verify dimensions before proceeding and obtain measurements at job site for work required to be accurately fitted to other construction. Measurements shall be accurate so that finished work is precisely assembled and fitted.

B. Report unsatisfactory tolerances in adjoining work.

C. Proceed with woodwork only after substrate construction and penetrating work have been completed and if necessary, corrected by other trades.

1.9 WARRANTY

A. Woodwork: Provide one-year warranty agreeing to repair or replace work which is not in conformance with requirements of Contract Documents or work that becomes out of adjustment.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers:

1. Artek Contracting, Inc., 503-641-6877.

2. Milltech Group, 800-755-3092.

3. Uncommon Cabinetry, Inc. 541-929-2701.

4. Burgener’s Woodworking, 360-694-9408.

5. Custom Source Woodworking, Inc., 360-491-9365.

6. J.S. Perrott, 503-234-1880.

B. Manufacturers: Submit company profile, marketing brochures, and list of references with names and phone numbers of Owner, Architect, and Contractor with your bid submittal.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 SOLID LUMBER MATERIALS

A. Blocking, Framing and Furring:

1. Sound, thoroughly-seasoned, and free from warp that cannot be corrected in process of bridging or nailing. Use same species for members in any one assembly.

2. Grades for framing materials: Conform to grading rules of The Softwood Manufacturer's Association for species of wood being used.

2.3 WOOD VENEER CASEWORK AND PANEL MATERIALS

A. General:

1. Comply with AWS Section 4 veneer face grade description for Grade AA veneers.

2. Provide thicknesses as indicated; if not indicated, provide minimum thicknesses required by AWS for Grade AA veneers.

3. Casework Core Stock: Medium density particleboard, complying with ANSI A208.1, 45 lbs./c.f. minimum average modulus of rupture of 2400 psi, minimum average modulus of elasticity of 400,000 psi.

a. Back: Hardwood back grade veneer of a similar species to balance face veneer.

b. Edges: Provide solid wood edging as detailed on all four edges, species to match face veneer.

2.4 CABINET HARDWARE

A. Hinges:

1. Door hinges: Concealed hinges for full overlay doors, 170 degrees opening with integral horizontal and vertical adjustment; soft-closing.

2. Approved Manufacturers: Julius Blum, Inc., and Grass America, Inc.

3. Door hinge quantity:

a. Two hinges for doors up to 36 inches high, 24 inches wide.

b. Three hinges for doors up to 48 inches high, 24 inches wide.

c. Four hinges for doors up to 82 inches high, 24 inch wide.

B. Drawer Slides:

1. Description: Full extension ball bearing slides. Julius Blum, Inc., and Accuride approved.

2. Mounting: Side.

3. Load capacity:

a. Desk drawers: 75 pounds per pair.

b. Bins and file drawers: 150 pounds per pair.

C. Pulls:

1. Plastic laminate faced casework: Hafele America 115.61.601, stainless steel, satin sheen.

2. Wood casework: Hafele America 115.61.601, stainless steel with threaded breakoff screw, M4 022.35.887.

3. Lateral file drawers and where noted: Hafele America 126.27.904 integrated pull, anodized aluminum, satin sheen.

D. Shelf Support Pin:

1. 5mm bored holes at 32mm o.c. with shelf pins.

2. U. S. Tek, 626-859-9225 "Engstrom #11 Seismic Shelf Clip," double pin, 500 lb. capacity.

3. Location: Open and concealed shelving.

E. Cable Holes: Holes in countertops covered with high impact ABS cable hole covers with spring closure top, Hafele America Co. Series 429.99, color compatible with countertop. Equal products manufactured by Doug Mockett approved.

F. Drawer and Door Locks:

1. Description: 5 pin tumbler, interchangeable core, keyed to building master, 2 keys per lock. Provide spacers to install lock flush with face of cabinet.

2. Finish: Brushed stainless steel 626.

3. Locations: Provide for each door and drawer where indicated.

4. Manufacturer: Schlage Lock CL777R (door) and CL888R (drawer).

G. Counter-Balance Assembly:

1. Acceptable Manufacturer: CounterBalance Corporation, 215-957-9260; Web: www.cbal.com

2. General: Assembly shall provide neutral balance through 9 1/2 inches of countertop travel, such that the countertop will stay in place if released anywhere within this range.

3. Type: CB 318, single and double tube configurations, with adjustment.

a. Finish: Clear Anodized

4. Cam Follower Arm:

a. Material: Stainless Steel

b. Thickness: 1/8”

c. Finish: Unfinished.

5. Cam:

a. Material: Aluminum, Alloy 6061 Thickness: 5/8”

b. Finish: Clear Anodized

H. Anchor Brackets:

1. Material: Aluminum, Alloy 6061

2. Thickness: Varies

3. Finish: Clear Anodized

4. D. Adjustment: +/- 5%, Bolt Drive with 9/16” Hex.

I. Assembly Mounting Bracket:

1. Material: Aluminum, Alloy 6061

2. Thickness: 1/4”

3. Finish: Clear Anodized

J. Countertop Mounting Bracket:

1. Material: Aluminum, Alloy 6061

2. Thickness: 1/4”

3. Finish: Clear Anodized

K. Casters:

1. Manufacturer: Shepherd Casters.

2. Model: Regent with 3” Vipor wheel and side brake.

3. Finish: Black oxide.

4. Model Number: PRI30120BO-VPR01(CG)B.

L. Folding Table Fittings:

1. Manufacturer: Hafele.

2. L-Steel Support: 25 x 25 x 3 mm (1" x 1" x 1/8")

3. Supporting arm length: 200 mm (7 7/8")

4. Model: 642.81.300, color black, supplied in pairs.

2.5 SOLID SURFACING

A. ST-1, Solid Surface Countertops: Caesarstone, 3/4-inch thick quartz countertops, polished finish.

1. Color: Refer to Finish and Material Legend.

2. Accessories: Mounting adhesives, surfacing adhesives, joint sealants, and cleaning solvents of type recommended by manufacturer for application and conditions of use.

2.6 PLASTIC LAMINATE CASEWORK

A. PL Tops and Faces: 0.050 grade NEMA Type 1 on countertops and open shelves and cabinet faces. Balance back sheet 0.020-inches thick on concealed portion of work.

1. PL Colors: Refer to Finish Material Legend.

B. Countertops Under High Pressure Laminate: 45 lb. density particleboard, 3/4-inch thick. Particleboard not permitted in sink counters.

C. Plywood in Sink Counters: HPVA hardwood plywood, exterior glue, 3/4-inch thick.

D. Particleboard Core Stock: 3/4-inch thick, complying with ANSI A208.1, 45 lbs./cu.ft. density, minimum average modulus of rupture of 2400 psi, minimum average modulus of elasticity of 400,000 psi.

E. Semi-Exposed Surfaces, Cabinet Shelves, and Partitions: Low pressure laminate (LPL) (polyester or melamine) laminated to particleboard with edge banding of the same material where edges are exposed. Color to be selected by Architect. Shelves 3/4-inches thick for spans up to 32-inch, 1-inch thick for spans from 32-inches up to 42-inches. Low pressure laminate on all semi-exposed surfaces.

F. Open Shelving:

1. PL face on shelf top and front edge. Balance sheet on shelf underside. Shelves 1-inch thick particleboard for spans up to 42-inches.

2. Shelf Hardware: Knape & Vogt heavy duty standard 87 and heavy duty bracket 186. Length of bracket shall match shelf depth.

G. Frame Stock: No. 1 shop kiln dried Douglas-fir.

H. Drawer and Door Edge Banding, Edge Banding on Open Shelves and Edges Behind Drawers and Doors: Square edge 3mm PVC, color to match plastic laminate.

2.7 FABRICATION

A. Fabrication:

1. Comply with referenced AWS standards.

2. Provide details and profiles indicated.

3. Fabricate units rigid, neat, free from defects, warp or buckle in accordance with final shop drawings.

4. Provide factory cutouts for openings in units as required to receive associated work.

5. Assemble prefinished units at the factory to the greatest degree possible and disassemble only as required for shipping to the site. Accurately mark units for assembly at site.

B. Cabinets:

1. Comply with AWS Section 10 Custom Grade.

2. Casework with Stain/Clear Coating Finish and Clear Coating Finish:

a. Drawer fronts and doors: Fabricate from casework core particleboard laminated with face and back veneer, edge banded with solid matching lumber.

b. Cabinet Sides and Exposed Rails: Casework core particleboard with face and back veneers, edge banded with solid matching lumber.

c. Edge banding to be applied to the core before laminating except where detailed otherwise.

d. Unexposed framing: Solid hardwood.

e. Prepare units for hardware, install at factory where practical.

f. Counter-Balance Assembly:

(1) Install in accordance with approved shop drawings, specifications and manufacturer's suggested installation guidelines.

(2) Install counter-balance assembly plumb, with all connection points to all existing substrates adequately anchored per manufacturers suggested installation guidelines.

(3) Thoroughly test installed counter-balance assembly to ensure that product is functioning per approved shop drawings, specifications and manufacturer's instructions. Adjust installed system as required to meet manufacturer's guidelines for product operation. Notify manufacturer if installed system cannot be adjusted, per manufacturer's instructions, to function in a satisfactory manner.

3. Casework with Plastic Laminate Finish: Apply high pressure laminate to tops, fronts, faces, ends, backsplashes, and trim in accordance with AWI Custom grade standards and as detailed and noted on the Drawings. Self-edge all countertops.

C. Paneling:

1. Comply with AWS Section 8, custom Grade.

2. 45 lb. particle core with veneer faces and solid wood edge banding. Edge banding to be applied to the core before laminating except where detailed otherwise.

3. Matching within panels: Book and balance matched.

4. Matching between adjacent panels: Blueprint match.

2.8 SHOP APPLIED FINISH

A. Fire Retardant Treatment:

1. Apply in accordance with manufacturer's instructions to components requiring treatment.

2. Verify compatibility with other finishes prior to treatment.

B. Provide complete factory finish.

C. Finish in strict accordance with requirements of AWS Section 5, Custom Grade.

D. CC-1, Clear Coating:

1. Materials:

a. Sealer: Sherwin-Williams vinyl sealer, T67 F 3.

b. Filler: Sherwin-Williams "Sher-Wood" fast-dry filler.

c. Top Coats: Sherwin-Williams “Acrylic Conversion Coating, Dull Rubbed Effect.”

2. Open Grain Woods Finishing Process:

a. Apply one coat sealer with brush or sprayer.

b. Sand, 220 grit.

c. Apply two top coats with sprayer, lightly sand between coats.

3. Add any of the following additional finishing steps in any order prior to top coats as required to achieve a uniform finish without sharp contrast in color or grain.

a. Bleaching.

b. Fillers.

c. Glazing.

d. Toning.

e. Sealers.

f. Washcoats.

E. WSC-1 Wood Stain, Clear Coating:

1. Materials:

   a. Stain: Color as selected by Architect.

   b. Sealer: Sherwin-Williams vinyl sealer, T67 F 3.

   c. Filler: Sherwin-Williams "Sher-Wood" fast-dry filler.

   d. Top Coats: Sherwin-Williams “Acrylic Conversion Coating, Dull Rubbed Effect.”

2. Open Grain Woods Finishing Process:

   a. Apply stain with brush or sprayer and then wipe for uniform coverage. Apply number of coats as required to match Architect's sample.

   b. Apply one coat sealer with brush or sprayer.

   c. Sand, 220 grit.

   d. Apply two top coats with sprayer, lightly sand between coats.

3. Add any of the following additional finishing steps in any order prior to top coats as required to achieve a uniform finish without sharp contrast in color or grain.

   a. Bleaching.

   b. Fillers.

   c. Glazing.

   d. Toning.

   e. Sealers.

   f. Washcoats.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine substrates and adjoining construction and conditions under which work will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide all necessary blocking, backing, framing, suspension, and other components necessary to provide a complete functioning system in the profile, dimensions, configurations, and materials indicated.

B. Exposed Blocking: Install surface mounted wood blocking, nailers, furring and grounds as required for wall-hung cabinetry and other wall-hung items, whether or not such blocking and similar items are indicated on drawings.

C. Unexposed Blocking: Unexposed internal blocking within the wall construction by others. Location of unexposed blocking to be determined by this trade.

3.3 INSTALLATION

A. General:

1. Comply with AWS Sections 6-Interior and Exterior Millwork, 8-Wall Surfacing, 10-Casework, and 11-Countertops, Custom Grade.

2. Install in accordance with final shop drawings and manufacturer's instructions.

3. Assemble and install work without machine and tool marks.

4. Neatly fit and scribe work to adjacent surfaces.

B. Wall Paneling and Cabinets:

1. Install with back mounted concealed fasteners, plumb and level, no exposed fasteners.

2. Securely attach to supporting substrates and blocking and furring.

3. Coordinate with electrical requirements to provide openings at receptacles and switches.

C. Countertops:

1. Install countertops straight, level and plumb.

2. Provide concealed grounds and anchor securely to walls.

3. Coordinate with electrical and plumbing requirements to provide openings at receptacles, switches and plumbing fixtures.

D. Solid Surfacing:

1. Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 1/16 inch in ten feet (1.6 mm in 3000 mm), and that necessary supports and blocking are in place.

2. Clean substrates of dust and contamination.

3. Clean quartz surfacing back side and joints with solvent.

4. Apply sufficient quantity of mounting adhesive in accordance with adhesive manufacturer’s recommendations to provide permanent, secure installation.

5. Install surfacing plumb, level, and square and flat to within 1/16 inch in ten feet (1.6mm in 3000 mm).

6. Joints between adjacent pieces of solid surfacing:

   a. Joints shall be flush, tight fitting, level, and neat.

   b. Securely join with stone adhesive.

   c. Fill joints level with solid surfacing.

   d. Clamp or brace solid surfacing in position until adhesive sets.

   e. Joints between backsplashes and countertops: Seal joints with silicone sealant.

3.4 ADJUSTING AND REPAIR

A. Before completion of work, adjust hardware until components operate properly.

B. Replace defective, damaged or missing hardware.

C. Touch-up marred finishes, including shop finishes to match adjacent surfaces.

D. Remove and replace units which are warped, bowed, not properly fitted or finished or otherwise damaged.

3.5 CLEANING AND PROTECTION

A. Clean work upon completion.

B. Protect units during construction so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

WEATHER RESISTANT BARRIER

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of mechanically attached water-resistive air barrier membranes and related accessories.

1. Related Section: Division 6 Section “Rough Carpentry.”

1.2 REFERENCE STANDARDS

A. American Association of Textile Chemists and Colorists (AATCC): ATCC 127 - Test Method for Water Resistance: Hydrostatic Pressure Test.

B. ASTM International (ASTM):

1. ASTM D882 - Test Method for Tensile Properties of Thin Plastic Sheeting.

2. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

3. ASTM E96/E96M - Test Methods for Water Vapor Transmission of Materials.

4. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

5. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

C. International Code Council Evaluation Service, Inc. (ICC-ES): ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers.

1.3 DEFINITIONS

A. ABAA: Air Barrier Association of America.

B. Weather Resistant Barrier (WRB): The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air and water movement through the wall.

1.4 SYSTEM DESCRIPTION

A. Complete Work as shown on the Drawings and specified herein to bridge gaps and seal the water-resistive vapor permeable air barrier membrane against air leakage and water intrusion.

1. Connections of the walls to the roof membrane.

2. Piping, conduit, duct and similar penetrations.

3. Screws, bolts, and similar penetrations.

4. All other air leakage pathways in the building envelope.

B. Install primary water-resistive vapor permeable air barrier, flashings, lap seam tape.

1.5 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Submit documentation from an approved independent testing laboratory certifying compliance with;

1. ASTM D882 - Tensile Properties.

2. ASTM E84 – Class A Surface Burning Characteristics.

3. ASTM E96/E 96M - Test Methods for Water Vapor Transmission of Materials.

4. ASTM E2178 - Standard Test Method For Air Permeance of Building Materials.

C. Submit documentation from an approved independent testing laboratory certifying the membrane meets ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers.

D. Submit manufacturers' current product data sheets, details and installation instructions for the mechanically attached water-resistive vapor permeable air barrier membrane components and accessories.

E. Manufacturer's verification of compatibility reports for all components and sealants.

F. Submit samples of the following:

1. Manufacturer's sample warranty.

2. Water-resistive vapor permeable air barrier sheet, minimum 10 by 10 inches (254 by 254 mm).

3. Components, minimum 12-inch (305-mm) lengths.

4. Membrane flashings and lap seam tapes.

5. Fasteners, clips, strapping and masonry ties.

6. Sealants.

1.6 QUALITY ASSURANCE

A. Single Source: Water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source membrane system to ensure total system compatibility and integrity.

B. Manufacturer Qualifications:

1. Manufacturer of specified products listed in this Section to have minimum 8 years of continued experience in the manufacture and supply of highly vapor permeable water resistive air barrier products successfully installed in similar project applications.

2. Manufacturer of specified products listed in this Section to have experienced in-house technical and field observation personal qualified to provide expert technical support.

C. Fire Performance Characteristics: Provide water-resistive barrier meeting the following fire-test characteristics.

1. Surface-Burning Characteristics: ASTM E84.

2. Flame spread index: 25 or less.

3. Smoke developed index: 450 or less.

D. Pre-Installation Conference:

1. Contractor shall convene one week prior to commencing Work of this section, under provisions of Division 1 Section “Project Management and Coordination.”

2. Ensure all contractors responsible for creating a continuous plane of water and air tightness are present.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to current Product MSDS for proper storage and handling.

B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

C. Store roll materials on end in original packaging. Protect rolls from direct sunlight and inclement weather until ready for use.

1.8 COORDINATION

A. Ensure continuity of the water-resistive vapor permeable air barrier system throughout the scope of this section.

1.9 WARRANTY

A. Provide manufacturer’s standard material warranty in which manufacturer agrees to provide replacement material for water-resistive vapor permeable air barrier sheets installed in accordance with manufacturer's instructions that fails due to material defects within 20 years of the date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Primary water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source to ensure total system compatibility and integrity.

B. Water-resistive vapor permeable air barrier membrane by VaproShield LLC., Gig Harbor, WA, Ph (866) 731-7663, Email: info@VaproShield.com, Website: www.vaproshield.com.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Water-Resistive Vapor Permeable Air Barrier Materials:

1. Primary water-resistive air barrier sheet membrane shall be WrapShield® Water-Resistive Vapor Permeable Air Barrier Sheet by VaproShield, a zero VOC, mechanically attached, water-resistive vapor permeable air barrier sheet membrane consisting of multiple layers of UV stabilized spun-bonded polypropylene having the following properties:

a. Color: Orange or Black with allowable UV exposure for 270 days**.**

b. Air Leakage: < 0.0019 cfm/sq.ft. (0.009 L/s/sq.m) when tested in accordance with ASTM E 2178 and < 0.000034 cfm/sq.ft. (0.00017 L/s/sq.m) when tested in accordance with ASTM E 283.

c. Water Vapor Permeance tested to ASTM E 96 Method B: 50 perms (2875ng/Pa.s.m^2).

d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage.

e. Tensile Strength tested to ASTM D 882: 44.8 lbf/inch (78 N/mm), machine direction; 25 lbf/inch (43.8 N/mm), cross-machine direction.

f. Application Temperature: No temperature restrictions.

g. Surface Burning Characteristics tested to ASTM E 84: Class A, Flame-spread index of less than 25, Smoke-development index of less than 450.

h. Physical Dimensions: 0.020 inches (0.51 mm) thick and 59 inches (1.5 m) wide and 5 oz per sq. yd. (170 g/sq. m).

B. Water-Resistive Air Barrier Sheet Membrane Fasteners:

1. Water-resistive air barrier sheet membrane fasteners shall be corrosion-resistant stainless steel screws with preformed head caps.

2. Screw head caps for water-resistive air barrier sheet membrane shall be VaproCaps by VaproShield, a 1-3/4-inch diameter preformed head caps with a center throat hole that

seals the membrane at the fastener penetration, specifically designed and tested to withstand wind loads and protect against water intrusion at screw penetrations.

3. Selection of fastener type is subject to sheathing board and substrate type. Manufacturer recommends subcontractor to supply and place corrosion-resistant stainless steel screws sized to penetrate gypsum sheathing board through to solid backing.

C. Water-Resistive Air Barrier Transition and Flashing Membranes:

1. Self-adhered air barrier transition and flashing membrane shall be VaproFlashing SA™ by VaproShield, a zero VOC self-adhered water-resistive vapor permeable membrane having the following properties:

a. VaproFlashing SA™ Orange: 11-1/2 inches or 19 inches wide x 164 feet long.

b. Air Leakage: < 0.0000263 cfm/sq. ft. @ 75 Pa (0.000134 L/s/m sq @ 75 Pa) when tested in accordance with ASTM E 2178.

c. Water Vapor Permeance tested to ASTM E 96 Method B: 50 perms (2875ng/Pa.s.m^2).

d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage.

2. Mechanically attached air barrier transition and flashing membrane shall be VaproFlashing by VaproShield, a zero VOC mechanically attached water-resistive vapor permeable membrane having the following properties:

a. VaproFlashing Orange or Black: 6 1/2 inches, 11 3/4 inches or 19 2/3 inches wide x 164 feet long.

b. Air Leakage: < 0.0000263 cfm/sq. ft. @ 75 Pa (0.000134 L/s/m sq @ 75 Pa) when tested in accordance with ASTM E 2178.

c. Water Vapor Permeance tested to ASTM E 96 Method B: 50 perms (2875ng/Pa.s.m^2).

d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage.

D. Water-Resistive Flashing and Penetration Tapes:

1. Tapes shall be VaproTape by VaproShield: UV stable, double/single sided, moisture-resistant flexible tape with adhesive backing having the following properties:

a. VaproTape (Single-Sided): 20 mil thick by 3 inches (76 mm) wide penetration seam tape.

b. VaproTape (Double-Sided): 30 mil thick by 1 inch (25 mm) wide penetration seam tape.

c. VaproTape UV-Resistant Black: 35 mil thick by 4 inches (102 mm) wide penetration seam tape.

d. VaproAlumaTape: 20 mil thick by 4.5 inches (114 mm) and 9 inches (229 mm) wide, foil faced, UV stable, moisture-resistant flashing and membrane transition tape for use with silicone sealants.

E. SAM-1, Self-Adhering, High-Temperature Flexible Flashing:

1. Minimum 30 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

2. Products/Manufacturers:

a. W.R. Grace & Co. "Ultra."

b. Henry “Blueskin PE 200 HT.

F. Penetration Sealant: Provide sealant for penetrations as recommended by manufacturer and as specified under Division 7 Section: Sealants.

G. Penetration Sealant: Provide sealant for penetrations as recommended by manufacturer and as specified under Division 7 Section: Sealants.

PART 3 EXECUTION

3.1 GENERAL

A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Architect in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

B. All surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the water resistive air barrier flashings. Fill voids, gaps in substrate to provide an even surface.

C. Minimum application temperature self-adhered membrane flashings to be above 20 degrees F (minus 6.0 degrees C).

D. Ensure all preparatory Work is complete prior to applying primary water-resistive weather barrier membrane.

E. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

3.2 COORDINATION OF MECHANICALLY ATTACHED VAPOR PERMEABLE AIR BARRIER MEMBRANE INSTALLATION

A. Mechanically attached vapor permeable air barrier sheets may be installed vertically or horizontally over the outside face of exterior sheathing board or substrate.

B. Complete detail Work around corners, wall openings, building transitions and penetrations prior to field applications.

C. Install mechanically attached vapor permeable air barrier sheet over the outside face of exterior sheathing board or substrate, measure and pre-cut into manageable sized sheets to suit the application conditions.

D. Install mechanically attached vapor permeable air barrier sheet complete and continuous to substrate in a sequential overlapping weatherboard method starting at bottom or base of wall and working up. Stagger end lap seams.

E. Secure the mechanically attached vapor permeable air barrier to substrate with suitable fasteners and specified preformed head caps along the top and bottom edge of membrane spaced 24 inches (600 mm) on center and along the middle spaced at 4 feet on center.

F. Use additional mechanical fasteners in field of sheet and tape joints if water-resistive weather barrier will be left exposed for prolonged periods prior to installation of cladding system.

G. Battens for cladding systems may be used as the attachment method to secure the mechanically attached vapor permeable air barrier to the substrates. Coordinate installation of air barrier membrane system with cladding subcontractors.

H. Wide flanged staples and/or plastic caped nails may be used to temporarily support the membrane during the initial installation and placement. Staples or plastic caped nails must be covered by subsequent membrane applications. Alternatively, seal over fasteners with specified 4 inch black tape.

3.3 BUILDING TRANSITION CONDITIONS

A. Tie-in to parapet curbs, roofing systems, and at the interface of dissimilar materials with self-adhering air barrier transition and flashing membrane.

B. Align and position self-adhered air barrier transition and flashing membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap on to substrates.

C. Ensure minimum 3 inch overlap at side and end laps of membrane.

D. Roll membrane and lap seams with roller to ensure positive contact and adhesion.

3.4 MECHANICAL EQUIPMENT PENETRATIONS

A. Mechanical pipe, electrical conduit and/or duct work must be secured solid into position prior to installation of self-adhered vapor permeable air barrier membrane.

B. Electrical services penetrating the wall assembly and self-adhered vapor permeable air barrier membrane must be placed in appropriate conduit and secured solid into position.

C. Install manufactured flanged penetration sleeves as recommended by sleeve manufacturer.

D. For straight sided penetrations, cut and fit self-adhered vapor permeable air barrier to accommodate sleeve, install specified single sided flashing tape to seal the air barrier membrane to ductwork or preformed flange sleeve.

E. For pipe penetrations, refer to manufacturer's standard details.

3.5 VERTICAL APPLICATIONS

A. For vertical applications, align mechanically attached vapor permeable air barrier sheet with an 'inside' or 'outside' corner to avoid wrinkles and miss-alignment of subsequent applications.

B. Hang sheets over wall and extend down to lowest point of wall. Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.

C. Seal and secure the mechanically attached vapor permeable air barrier sheets across the top of the wall edge and bottom of wall edge back to the substrates with specified double sided butyl tape, or single sided tape and roll surfaces to ensure adhesion. Alternatively place membrane into a continuous bead of non-skinning butyl sealant.

D. Secure sheets with appropriate fasteners based on substrate starting at highest point and working down. Ensure sheets lay smooth and flat to surfaces.

E. Install subsequent sheets of water-resistive vapor permeable air barrier sheets in overlapping weatherboard format.

F. Provide minimum of 6 inch (150 mm) overlaps for vertical and horizontal lap seams. Tape lap seams with 3 inch (75 mm) wide tape centered over edge of lap seam.

G. Align and place tape over the edge of lap seam, remove release film, and apply pressure to ensure positive contact. Roll taped lap seams to ensure adhesion.

3.6 HORIZONTAL APPLICATIONS

A. For horizontal applications, align mechanically attached vapor permeable air barrier sheet and begin installation of water-resistive weather barrier at bottom or lowest point of wall.

B. To avoid wrinkles and miss-alignment of subsequent applications it is recommended to pre-mark or "Snap" a level line to work from. Measure and pre-cut into manageable sized sheets to suit the application conditions.

C. Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.

D. Seal and secure the mechanically attached vapor permeable air barrier sheets across the top of the wall edge and bottom of wall edge back to the substrates with specified double sided butyl tape,

or single sided tape and roll surfaces to ensure adhesion. Alternatively place membrane into a continuous bead of non-skinning butyl sealant.

E. Secure sheets with appropriate fasteners based on substrate starting at highest point and working down. Ensure sheets lay smooth and flat to surfaces.

F. Install subsequent sheets of water-resistive vapor permeable air barrier sheets in overlapping weatherboard format.

G. Provide minimum of 6 inch (150 mm) overlaps for vertical and horizontal lap seams. Tape lap seams with 3 inch (75 mm) wide tape centered over edge of lap seam.

H. Align and place tape over the edge of lap seam, remove release film, and apply pressure to ensure positive contact. Roll taped lap seams to ensure adhesion.

3.7 BATTENS AND VENTILATION STRIPS FOR RAIN SCREEN CLADDING SYSTEMS

A. Provided and installed under mineral fiber cement siding.

3.8 FIELD QUALITY CONTROL

A. Make notification when sections of Work are complete to allow review prior to covering water-resistive weather barrier system.

B. Owner to engage independent consultant to observe substrate and membrane installation prior to placement of cladding systems and provide written documentation of observations.

3.9 PROTECTION

A. Protect wall areas covered with primary water-resistive vapor permeable air barrier from damage due to construction activities, high wind conditions, and extended exposure to inclement weather.

B. Review condition of water-resistive weather barrier prior to installation of cladding. Repair, or remove and replace damaged sections with new membrane.

C. Recommend to cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed primary water-resistive weather barrier installations.

D. Remove and replace water-resistive vapor permeable air barrier affected by chemical spills or surfactants.

END OF SECTION

CELLULOSE FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, services and equipment required in conjunction with design, fabrication, and installation of the siding as detailed, including, but not limited to, siding, moldings, fasteners, sealants, and adhesives for a watertight installation.

B. Related Section: Division 7 Section “Weather Resistant Barriers.”

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures".

B. Product data for each type of component required including specifications, installation instructions and general recommendations from manufacturer.

C. Shop drawings including elevations and sections for all components detailing installation of siding. Where shop drawings deviate from drawing or specification requirements, note such deviations on shop drawings and provide written explanation for deviation.

D. Samples for verfication purposes of siding materials, not less than 10-inches long.

E. Warranty, as described below.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility for Material: Obtain material from a single source with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work. Manufacturer shall have successfully completed at least five projects of the type, scope, and quality required within the past five years.

B. Installer Qualifications: Engage an experienced installer with not less than three years' successful experience in completing exterior cladding systems similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance. Workers shall be skilled in their designated tasks and under the supervision of trained foremen.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials at site flat, under cover, elevated above grade on level blocking and covered to keep material clean and dry. Covering over material is to be ventilated to prevent condensation. Avoid rain or standing water.

1.5 WARRANTY

A. Provide manufacturer's standard warranty for a period of 30 years from the date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Siding: James Hardie, 888/542-7343.

B. Other Products: Manufacturers are listed below.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements".

2.2 MATERIALS

A. Panel Siding: James Hardie “Hardie Reveal 2.0 System,” 7/16-inch thick, nominal 4’ x 8’ panels, smooth texture.

B. Trim Boards: James Hardie “HardieTrim Boards,” sizes and locations as detailed.

C. Primer: James Hardie “PrimePlus” factory priming system.

2.3 ACCESSORIES

A. Panel System Trim: Extruded aluminum edge and reveal trim (1/2” reveal), manufacturer’s standard finish.

B. Sealants: Tremco "Dymonic" one-part urethane sealant used with xylol wipe and primer (for weather seal only).

C. Concealed Fasteners:

1. For fastening to wood, use hot-dip galvanized, ribbed bugle-head screws of sufficient length to penetrate a minimum of 1-1/4 inch into substrate.

D. Exposed Fasteners: Exposed on surface of fiber cement siding.

1. Type: Stainless Steel, wing-tipped wafer head fiber cement screws.

2. Corrosion Resistance: 1000 hours of salt spray test per ASTM B117 with no visible sign of surface red rust.

3. Length: As required to penetrate minimum 1-1/4 inch into solid backing.

E. Siding Vent System Furring: Cor-A-Vent, Inc., “Sturdi-Strips” vertical furring strips and SV-3 horizontal airflow vent/insect screen. SV-3 runs linearly along the top and bottom of the wall.

F. Furring: 5/8-inch APA Exterior rated plywood, width as detailed, pressure preservative treated.

G. Insect Screen: Polyester coated glass fiber, color black.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which work is performed with installer present to determine if there are satisfactory conditions for installation of the system. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

B. Measure areas prior to installation to minimize out of square or unbalanced border conditions.

C. Proceed with installation only when substrate is completely dry.

D. Coordinate with installation of weather resistant barrier, Division 7 Section “Weather Resistant Barriers” to ensure it is complete and ready for cover.

3.2 INSTALLATION

A. Comply with panel manufacturer's instructions and recommendations for installation and with governing regulations and industry standards as applicable to project conditions and supporting substrates. Provide adequate provisions for thermal and structural movements.

B. Installation Tolerances: Align siding boards within installed tolerance of 1/8-inch in 10 feet on horizontal, non-accumulative. End joints shall align within 1/32-inch.

C. Comply with instructions and recommendations as set forth in manufacturer's technical data except to the extent more stringent requirements are indicated.

D. Caulk end joints at vertical trim, flash butt joints per manufacturer’s standard flashing detail.

E. Touch up all field cut edges by priming before installing.

F. Pre-drill nail holes if necessary to prevent breakage.

G. Install furring strips as detailed using fasteners as specified for concealed fastening.

H. Siding Over Wood with Wood Furring: Fasten siding through furring strips only. Verify holding strength of fasteners and pull-out value of substrate with fiber cement siding manufacturer before proceeding.

I. Furred Installation: Leave space at top and bottom open; top may be behind soffit. Install corrosion-resistant insect screen at bottom of furring strips by wrapping a strip of screen behind bottom ends of vertical furring strips.

3.3 ADJUSTING

A. Inspect siding components for proper fit. Adjust, repair, or replace components not conforming to requirements.

3.4 CLEANING

A. Clean all siding of dirt, adhesive, and sealant using detergents or solvents as appropriate and as recommended by the manufacturer.

B. Remove and replace all damaged siding.

C. Protect all work until Substantial Completion.

END OF SECTION

TPO SINGLE PLY MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for and incidental to the application of thermoplastic polyolefin (TPO) single ply membrane roofing materials necessary for a complete weathertight installation. Include tear-off and disposal of existing roofing system.

B. Related Sections:

1. Division 2 Section “Demolition.”

2. Division 6 Section "Rough Carpentry" for installation of wood insulation stops.

3. Division 7 Section "Flashing and Sheet Metal" for application and securing of metal counterflashings, coping and other weatherproofing work.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Factory Mutual Engineering and Research (FM).

C. Federal Testing Material Standard (FTMS).

D. International Code Council (ICC).

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 and code required wind criteria for the Project’s wind exposure classification.

D. Regulatory Requirements: Roof system shall meet requirements of UL Class A Roof System.

1.4 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Submit a Pre-Job Survey form to the roof membrane manufacturer's technical department for approval prior to the job start. This enables the technical department to approve the intended assembly and assign a job number to the project. This submittal may include deviation request forms or pullout test results, depending on the project criteria.

C. Shop Drawings:

1. Shop drawings prepared by the authorized roofing applicator, and approved and assigned a number by the manufacturer.

2. Shop drawings shall include:

a. Outline of roof and size (square footage).

b. Deck type.

c. Roof slope and designated direction of slope.

d. Location and type of all penetrations.

e. Location of walking pads.

f. Perimeter and penetration details.

g. Sheet layout and sizes.

h. Membrane and insulation fastener pattern to meet roof membrane manufacturer's wind uplift warranty requirements.

3. When field conditions necessitate modifications to the originally approved shop drawings, a copy of the shop drawing outlining all modifications must be submitted to the membrane manufacturer for revision and approval prior to submitting to Architect for review.

4. Submit final shop drawings to membrane manufacturer prior to inspection and warranty issuance.

D. Product Data:

1. Roof System: Copies of most recently published properly identified product data for TPO single ply membrane roofing, accessory components, and published installation instructions.

2. Insulation manufacturer, brand, thickness, and product data.

3. Fastener manufacturer, brand and length.

E. Warranty type and period.

F. Certification:

1. Submit certification that membrane applicator is approved by membrane manufacturer for application of warranted membrane.

G. Manufacturer's current roofing brochure.

H. One 3-inch x 6-inch sample of roofing membrane.

I. Testing or proof of resistance to chemicals or materials that may deteriorate the membrane.

J. Certificate of manufacturer's warranty and installer's guarantee.

K. Proof of successfully passing EPA TCLP testing. Submit tested evidence that membrane shall be acid/base neutral and shall not release heavy metals or other hazardous materials into surface run-off.

L. Refer to Part 2 of this Section for additional submittal requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in mechanically attached, reinforced, TPO membranes with ten years experience. The manufacturer shall certify the scrim reinforced TPO membrane meets the physical properties specified.

B. Applicator: Company approved by membrane manufacturer and specializing in single ply roofing systems with at least four installations of mechanically attached, scrim reinforced TPO roofing within the past two years.

C. Inspection:

1. As soon as all Work under this Section has been completed, the roofing installer shall notify the manufacturer of completion of Work, and the roofing manufacturer's representative shall conduct an inspection of the roofing system. A punch list of all items failing to meet the manufacturer's requirements shall be forwarded to the roofing installer and Architect. Correction of the punch list items shall be completed within 14 days at which time the roofing installer shall be given written notification to the manufacturer that the installation meets with the manufacturer's warranty requirements.

2. A pre-warranty inspection by the membrane manufacturer and Owner in the presence of the Architect shall be performed to determine that the Work is acceptable, complete, and ready for issuance of appropriate warranty. However, the warranty will not be issued until Substantial Completion, when the membrane will be reinspected by the membrane manufacturer, Owner and Architect. Damaged membrane shall be repaired prior to issuing the warranty.

D. Changes or deviations from this Specification shall be approved in writing by the manufacturer and be acceptable to the Owner.

E. Pre-Roofing Meeting:

1. Schedule and administer Pre-Roofing Meeting to review single ply roofing system products, application, compatibility, scheduling, interface coordination, warranty/ guarantee and quality standards, with attending Architect, roofing applicator's representative, job superintendent, manufacturer's representative, subcontractors, and suppliers for the work of this Section, Division 6 Section "Rough Carpentry," and Division 7 Section "Flashing and Sheet Metal." Record and distribute minutes of the Pre-Roofing Meeting to attendees and others responsible for related work listed herein. Satisfactory adoption of the minutes of the Pre-Roofing Meeting minutes by all will be automatic when no written amendments to the minutes are received within fourteen days after the Pre-Roofing Meeting.

2. Membrane manufacturer will provide technical assistance for Pre-Roofing Meeting and initial start-up of the work.

F. Product Compatibility: Provide products which are components of a single manufacturer, or are certified by the membrane manufacturer as compatible.

G. Manufacturer's Requirements: Where any provision or requirement of product installation called for in these Specifications is in conflict with the membrane manufacturer's printed installation procedures, the manufacturer's instructions shall prevail.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in original unopened containers with manufacturer's identification and installation instructions.

B. Materials, except membrane, to be stored at ambient temperature of 60°F to 80°F. If stored at lower temperature, restore to proper temperature prior to using.

C. Store all materials, including membrane, in a dry, protected area. Damaged materials must not be used. Installed materials found to be damaged shall be replaced at contractor's expense.

D. Protect the membrane from abuse or damage during storage.

1.7 PROJECT CONDITIONS

A. Weather Protection: Protect roofing material at all times from wetting and moisture absorption. Store rolls on end in a dry area, protected from ground moisture and covered at all times with waterproof covering. Remove improperly stored and moisture damaged material from the premises. Phase the work to complete roofing assembly in each area without interruption when practical. Install only the amount of insulation that can be covered during the same day.

B. Site Conditions:

1. Roof deck shall be dry and free from ponded water, frost, or other moisture source prior to start of roofing system.

2. Protect roofing system from petroleum, grease, oil, solvents, vegetable and mineral oil, animal fat, or direct steam venting.

3. Do not expose membrane and accessories to a constant temperature in excess of 180°F.

4. All splicing and bonding surfaces shall be kept dry and clean.

1.8 WARRANTY

A. Contractor's Warranty Agreement:

1. Provide a written notarized warranty cosigned by the Contractor and roofing installer covering both roofing and sheet metal for a period of two years from Substantial Completion, warranting that all surfaces exposed to the weather are watertight and free from defective materials and deficiencies in workmanship, and that any portion of this work which fails in the performance of its purpose will be repaired or replaced at no cost to the Owner.

2. Emergency leaks will be attended to within 24 hours from receipt of notice from Owner. As soon as weather permits, Contractor will restore affected areas to standards of this contract without voiding the manufacturer's warranty and repair any damages from these leaks without cost to Owner, except for leaks caused by abuse to roof by others or by abnormal weather conditions such as lightning, severe hail, or other unusual climatic phenomena.

B. Manufacturer's Warranty:

1. Submit to the Architect a manufacturer's total system unlimited penal sum warranty covering all repairs and replacements to keep the roof (including the field and flashing) watertight for period of 20 years beginning at Substantial Completion.

2. The warranty shall be from the manufacturer of the membrane, not the marketer. No rebranded products shall be accepted.

3. The warranty shall include the plates and fasteners of the fastening systems, the insulation and the termination bars.

4. The warranty shall contain no exclusion for damage caused by wind. Wind speed limitation under warranty shall not be any less than that calculated by code required wind criteria for the Project's wind exposure classification, but not more than 72 mph.

5. The warranty shall contain no exclusion or limitation for improper installation, or damage from environmental contaminants, or damage from water that ponds, or does not drain freely.

6. The warranty shall be executed by manufacturer to cover any and all costs for repairs necessary to stop leaks which occur resultant of, but not limited to, the following:

a. Deterioration of the roofing membrane or base flashing system resulting from ordinary wear and tear by the elements.

b. Workmanship on the part of the roofing contractor in application of the roofing membrane or base flashing system.

c. Splits or cracks in the roofing membrane not caused by structural movement.

d. Slippage of the roofing membrane or base flashing.

e. Delamination of membrane seams.

7. If after 24 hours notification of roof leakage, manufacturer has not responded, Owner shall have the right, without invalidating his warranty and at the expense of the manufacturer, to make any emergency temporary repairs that are required in order to protect the building and its contents from damage due to roof leakage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Mechanically attached, reinforced, TPO single ply membrane manufacturers: Genflex TPO," 800-443-4272.

B. Other Approved Manufacturers: Subject to compliance to requirements of this specification, equal products by the following manufacturers are approved:

1. Carlisle, 877-409-2706.

2. Johns Manville, 800-654-3103.

3. Firestone, 800-428-4442.

C. Other Products: Manufacturers are listed below.

D. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

E. Additional submittal requirements for Substitution Requests are:

1. Complete specification with details for Architect’s review, along with certification from Manufacturer of substitute membrane, that proposed material and system is in compliance with all other requirements of this specification. Submit data as detailed in Part 1, above.

2. List of completed projects similar in location and magnitude to this project.

3. Proof of at least ten years experience as manufacturer of reinforced TPO roofing membrane.

4. Proof of meeting or exceeding the physical properties specified.

5. Verification of UL Class A with a minimum 6-foot wide membrane attachment, in order to minimize seams on the roof. Every roll of membrane shall be UL labeled.

6. Proof that membrane and insulation fasteners pass 45 cycles of Kesternich testing with a maximum of 5% red rust.

7. Provide adequate background information to the Architect, to demonstrate that manufacturer has the capability to service, and back the warranty for the term herein specified.

8. Manufacturer shall submit data regarding intended installing contractors demonstrating that they shall have been an authorized contractor of the intended roof system for at least two years prior to bid date and shall have completed at least four warranted, 20,000 s.f., non-residential projects with the intended roofing system in the last two years.

2.2 MATERIAL

A. Elastomeric Sheet Material: Single ply membrane shall be 60 mil overall thickness, white TPO membrane reinforced with a polyester 10 x 10, 1000D scrim encapsulated in one pass through the calendar. There shall be more than 20 mils of TPO membrane between the scrim and the weathering surface of the roof. The TPO sheet physical properties must be actual tested properties of the sheet, not typical or hypothetical values. In order to minimize seams on the roof, the minimum width of the membrane shall be 6-feet-4-1/2-inches except for 1/2 width sheets at roof perimeter. The membrane shall have the following physical properties:

Physical Property	Test Method	Specification
1. Weight	ASTM D751	0.31 lbs/s.f.
2. Breaking Strength, min.	ASTM D751	330 lbs.
3. Tear Strength, min.	ASTM D751	156 lbs. MD
4. Low Temperature Bend	ASTM D2137 -49°/1/8-inch mandrel	Pass
5. Heat Aging	ASTM D573/ASTM D751	Maintains 90% of original strength at breaking and elongation at reinforcement, 60% at tearing strength
6. Solar Reflectance, white	ASTM C1549	77%
7. Thermal Emittance	ASTM C1371	0.87%
8. Hydrostatic Resistance	ASTM D471 7 days	+/- 3%
9. Ozone Resistance Test	ASTM D1149	Pass

Performed on Unreinforced Material Only	3 ppm (@ 30% strain @ 104°F (40°C): 72 and 2500 hrs.	
10. Puncture Resistance	ASTM D5602 Static ASTM D5635 Dynamic	33 lbs. minimum 20 Joules
11. Elongation at Reinforcement Break, min.	ASTM D751	30%

B. Mechanically Attached System: Provide membrane manufacturer's standard system of plates and fasteners for attachment of the membrane to substrate at sheet perimeter and at intermediate locations to meet requirements for wind uplift warranty.

2.3 RELATED MATERIALS

A. Flashing: Same membrane as roofing. For field-fabricated vent stacks, pipes and corners provide unreinforced 55 mil thick white TPO.

B. Bonding Adhesive: Genflex Membrane Adhesive for bonding membrane to substrate.

C. All Purpose Sealant: "Genflex Multi-Purpose Sealant" to serve as a water cut-off mastic, pitch-box sealer, and to caulk membrane edge to metal.

D. Cleaning Solvent: "GenFlex Membrane Cleaner" for cleaning membrane as required prior to seam sealing.

E. Seam Caulk: "GenFlex Edge Sealant" shall be provided for the purpose of sealing any nonencapsulated edge of reinforced membrane.

F. Overnight Seal: As provided by membrane manufacturer.

G. Sealants: Sealants not a part of the membrane manufacturer's system shall be compatible with the membrane materials, approved by membrane manufacturer, and applied according to sealant manufacturer's instructions. Acceptable sealants are one part polysulfide and one part urethane. They shall be free of pitch extenders, exterior grade, suitable for horizontal or vertical applications according to their usage, and shall be recommended by sealant manufacturer for the particular usage. Silicone sealants are not acceptable.

H. Mechanical Fasteners:

1. Wood Deck:

a. Insulation Fasteners: GenFast #12 (preassembled insulation fastener).

b. Membrane Fasteners: GenFast #15 (assembled screw and plate).

c. Where 1-1/4-inch plywood decking occurs, the underside is the finished ceiling, therefore fasteners shall be sized to prevent deck penetration.

I. Slip Sheet: Atlas FR 50 mineral glass felt mat, 0.188 lbs./s.f.

J. Vapor Barrier: GenFlex “Vapor Shield Membrane,” self-adhering sheet of SBS modified asphalt

K. Roof Walkways: Provide walkways over membrane as detailed and where required for regular traffic to service rooftop units. Walkway may consist of laminated TPO walk boards adhered to the membrane with "GenFast Bonding Adhesive."

L. Polyisocyanurate Insulation:

1. Rigid polyisocyanurate, CFC, HCFC free, LTTR-38 (Long Term Thermal Resistance), integrally laminated to heavy non-asphaltic fiber-reinforced felt facers, and shall be satisfactory to and approved by roofing manufacturer for installation with roofing membrane when installed in strict accordance with approved shop drawings and limitations set forth in insulation manufacturer’s published literature. Provide crickets and tapered insulation where detailed.

2. Manufacturing Standards:

a. Standard Specification ASTM C1289-01, Type II, Class 1, Grade 2.

b. Density: ASTM D1622, Nom. 2 pcf.

c. Compressive Strength: ASTM D1621, 20 psi.

d. Dimensional Stability: ASTM D2126, 2% max., 7 days.

e. Moisture Vapor Transmission: ASTM E96, <1.5 perm.

f. Water Absorption: ASTM C209, <1.0% volume.

3. Testing Standards:

a. Windstorm Classification: FM 4450/4470, Class 1.

b. External Flame: UL 790 (ASTM E108) Class A.

c. Internal Flame: UL 1256, Class A.

d. Long Term Thermal Resistance (LTTR): CAN/ ULC S770 and ASTM C1303-95.

4. Manufacturers: Provided by and warranted by membrane manufacturer.

M. Cover Board: G-P Gypsum Corporation "Dens-Deck Prime Roof Board", moisture resistant, 1/2-inch thick, 48-inches wide, 96-inches long.

2.4 SUMMARY OF MATERIALS

A. System Type 1: Single ply membrane over insulated wood deck.

1. Vapor barrier.

2. Rigid insulation.

3. Cover board.

4. Slip sheet.

5. Single ply membrane.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine substrate and conditions under which roofing work is to be performed and correct unsatisfactory conditions. Do not proceed with roofing work until unsatisfactory conditions have been corrected in manner acceptable to installer and manufacturer. In all cases, substrate shall be smooth and free of debris, sharp edges and other surface irregularities prior to the start of work. Start of work constitutes acceptance of substrate.

1. During installation, membrane manufacturer shall be contacted for verification of conditions not previously identified.

3.2 PREPARATION OF SUBSTRATE

A. Substrate shall be dry, clean, smooth, free of sharp edges, and suitable for acceptance of membrane. Cover rough surfaces that would cause damage to the membrane with a protection board. Fill or repair joints greater than 1/4-inch wide. Plates and screws must be used to anchor membrane to roof deck.

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.

2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3.3 INSTALLATION

A. General: Comply with manufacturer’s written instructions for installation of the single ply membrane. Comply with all applicable codes.

B. Vapor Barrier Membrane: Cover entire roof deck over to and including top of wall construction, closing vapor barrier at wall weather resistant barrier by overlapping weather resistant barrier where applicable, or as otherwise detailed.

C. Insulation and Cover Board: Mechanically fastened in accordance with board manufacturer’s requirements to meet membrane manufacturer’s requirements for wind criteria warranty. Install a minimum of 8 fasteners per 4-feet x 8-feet.

1. Attachment:

   a. Insulation must be recommended by its manufacturer for mechanical attachment. All boards must be mechanically attached by a membrane manufacturer-approved plate and fastener.

   b. Secure insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

   c. All fasteners are to be a minimum of 6-inches from both edges of the board. Irregular surfaces shall require additional fasteners. Boards shall conform to deck surface. Should the insulation manufacturer's fastening requirements exceed those of the membrane manufacturer, the more stringent requirements shall be followed.

2. Install tapered insulation to achieve positive slope throughout roof in accordance with roofing manufacturer's recommendations.

3. Place approved insulation with its longest dimension perpendicular to the direction of the membrane seams, with joints staggered. Where insulation thickness requires multiple layers of insulation board, joints of each layer shall be offset in both directions from the joints of the previous layer by a distance as required by the membrane manufacturer. Place insulation uniformly, allowance for expansion/contraction with a 1/8-inch joint gap recommended, but close voids over 1/4-inch. Place cover board over insulation, with joints staggered. Mechanically attach as specified by the membrane manufacturer.

D. Membrane Installation:

1. Use 6-foot wide minimum sheets to minimize seams. Accommodate contours of roof deck to drain across shingled laps of sheets. Do not stretch membrane prior to attachment.

2. Install membrane by unrolling over prepared substrate, fastening at laps, perimeter and at penetrations. Lap adjoining sheets a minimum of 4-1/2-inches and heat seal as recommended by the manufacturer. Seal all non-encapsulated edges with seam caulk.

3. Mechanically Attached Membrane:

   a. Attach membrane with fasteners and plates into roof deck, following manufacturer's instructions for installation and spacing.

   b. Perimeter half sheets: Install two at all exterior roof perimeters that are not bordered by a parapet wall or an adjoining building that is a minimum of 24-inches higher than roof level. Lay out in an approved pattern as detailed. Install plates and screws or anchors along the leading edge of the membrane through the insulation into the roof deck. See manufacturer's standard details for fastener spacing location. At perimeters that are to receive metal edging, continue the membrane over the outside edge and terminate 12-inches o.c.

E. Additional Membrane Securement:

1. The membrane must be secured at the perimeter of each roof level, roof section, expansion joint, curb, skylight, interior wall, penthouse, etc., at any angle change which exceeds 2" in one horizontal foot and at all other penetrations in accordance with manufacturer's details published with manufacturer's specifications.

F. Flashing: Flash perimeter, curb, vents, expansion joints, drains, and other details in compliance with manufacturer's standard published details. Exercise care to minimize possibility of damage to membrane.

1. Apply bonding adhesive to both underside of flashing and surface to which it is to be bonded at a rate of approximately one gallon per 60 s.f. of flashing.

2. Bonding adhesive shall not be applied to that portion of the flashing that overlaps onto itself. Hot air welding shall be used throughout the system where membrane overlaps itself.

3. Allow bonding adhesive to dry to finger touch where it does not string or stick to a dry finger, then roll the flashing into the dry adhesive. Exercise care to assure that the flashing does not bridge where there is any change of direction.

4. Mechanically fasten flashing 12-inches o.c. under appropriate counter flashing with approved fasteners for substrate, in accordance with manufacturer's details.

5. Install pipe flashings, expansion joints and roof drains in accordance with manufacturer's standard details.

G. Check and repair seams at the completion of work each day.

H. Temporarily seal loose edge of membrane with approved overnight seal at the end of each day to comply with manufacturer's instructions.

I. Walkway Protection: Install specified walkway protection at roof access areas and around roof mounted equipment. Place walkway protection carefully to avoid damage to membrane.

J. Inspect roofing and repair of bonding defects, raised or exposed fasteners, loose flashings, or other deficiencies.

3.4 REQUEST FOR WARRANTY INSPECTION

A. Request for warranty inspection shall be completed by the roofing applicator and be forwarded to the roofing manufacturer at least 14 days prior to the requested date of inspection. Special information regarding access to the roof shall be included on the request form.

B. The warranty shall be issued to the Owner after satisfactory final inspection by the roofing manufacturer's representative at Substantial Completion.

3.5 CLEANING

A. Upon completion of the Work, remove from the premises all debris and surplus material. Leave the work area in a clean condition and ready for use.

END OF SECTION

FLASHING AND SHEET METAL

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required to install flashings and all other sheet metal items required to weatherproof the building.

B. Related Sections:

1. Division 7 Section “Weather Resistant Barrier” for weather resistant barrier and flexible flashing systems.

2. Division 7 Section “TPO Single Ply Membrane Roofing.”

1.2 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, oil-canning, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

1. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2. ANSI/SPRI ES-1 2017 Test RE3 for Coping: Wind Design Guide for Edge Systems Use with Low Slope Roofing Systems (current edition). Coping systems shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accordance with the ANSI/SPRI test method.

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA).

B. American Society for Testing and Materials (ASTM).

C. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) "Architectural Sheet Metal Manual."

D. ANSI/SPRI ES-1 2017 Wind Design Guide for Edge Systems Use with Low Slope Roofing Systems.

1.4 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

C. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.

2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.

3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.

4. Details of termination points and assemblies, including fixed points.

5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.

6. Details of edge conditions, including roof ridges and reglet counterflashings as applicable.

7. Details of special conditions.

8. Details of connections to adjoining work.

9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

D. Samples for Color Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

E. Qualification Data: For qualified fabricator/installer.

F. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.

2. Review methods and procedures related to sheet metal flashing and trim.

3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.

4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.

5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate with roofing installer for installation of all related weatherproofing items and provision of roofing guarantee responsibility.

B. Coordinate with installers of exterior claddings and penetrations of the exterior envelope for installation of flashings and all related weatherproofing items.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.8 WARRANTY

A. Furnish a written notarized warranty cosigned with the subcontractor covering both roofing and sheet metal for a period of two years from the date of Substantial Completion, warranting that all surfaces exposed to the weather are watertight and free from defective materials and deficiencies in workmanship, and that any portion of this Work which fails in the performance of its purpose will be corrected or replaced.

B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Flashings:

1. Galvanized steel sheet, G115 coating designation per ASTM A653, 1.15 oz./s.f. coating, precoated with baked fluoropolymer with 70% PVDF in resin per AAMA 621.

2. Gauge:

a. 24 gauge (0.024-inch) minimum thickness for general flashing.

b. Heavier gauges where specifically noted or recommended by SMACNA Manual for size of component.

c. Steel sheet thickness measured before galvanizing.

3. Custom colors as selected by Architect.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Provide wood screws, flat head screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Fasteners shall be galvanized steel at galvanized sheet steel flashings. Fasteners shall be Series 300 stainless steel at stainless steel flashings.

C. Exposed Fasteners: Self-drilling screws with EPDM washers; heads matching color of sheet metal by means of factory-applied coating.

D. Concealed Fasteners:

1. Self-drilling screws, gasketed, with hex washer head.

2. Concealed gutter support straps, screw attached.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied.

G. Joint Sealant: Dow 790, one part neutral cure low modulus moisture curing silicone.

H. Pre-Manufactured Reglets: Type for two-piece flashing system. Match flashing sheet metal type, gauge, and finish.

1. Fry Reglet Corp. "Springlok."

2. Cheney Flashing Co. "Snap Lock."

3. MM Systems Corp. "Snap-Tite System."

I. Paint Primer for Non-Precoated Metals:

1. Galvanized Metal: Etch with phosphoric acid solution prior to applying primer.

2. Ferrous, Non-Ferrous, and Galvanized Metals: One coat PPG Pitt Tech Primer Finish DTM 90-712.

2.4 FABRICATION

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Fabricate all sheet metal items accurately to sizes as detailed, installing same by securely fastening them to the other parts of the work. Do all work, metal forming, etc., to highest standards that will produce weatherproof, properly seamed, joined and sealed work, free from surface stains and wrinkled or buckled finishes. Reinforce seams and folds as required to prevent binding or tearing.

C. Miscellaneous Fabrications: On fabrications of intricate design that do not lend themselves to fabrication with precoated steel, use 24 gauge (0.024-inch) galvanized steel sheet or heavier as recommended by SMACNA Manual for size of component, G115 coating designation per ASTM A653, 1.15 oz./s.f. coating, mill phosphatized. Prime and paint to match color of precoated finish.

2.5 FABRICATION

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems. Reinforce seams and folds as required to prevent binding or tearing.

4. Miscellaneous Fabrications: On fabrications of intricate design that do not lend themselves to fabrication with precoated steel, use 24 gauge (0.024-inch) galvanized steel sheet or heavier as recommended by SMACNA Manual for size of component, G90 coating designation per ASTM A653, 0.90 oz./s.f. coating, mill phosphatized. Prime and paint to match color of precoated finish.

5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Field verify dimensions prior to fabrication.

C. Form sections true to shape, accurate in size, square, and free from distortion or defects.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal. Fabricate in sizes recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

E. Form pieces in longest possible lengths.

F. Hem exposed edges on underside 1/2 inch; miter and seam corners.

G. Form material with standing seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

1. Standing Seams: 1-inch high with sealant at folded corners.

2. Solder-Lap Seams: 1-inch finish width; sweat full with solder if metal is not prefinished.

3. Double S Lock Seams: Form 1-1/4 inch with S shaped seam on each edge of flashing sheet for concealed fastening.

H. Fabricate corners from one piece with minimum 18-inch-long legs; seam for rigidity, seal with sealant. Solder galvanized steel that is not prefinished. Do not solder prefinished steel.

1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

J. Fabricate flashings to allow toe to extend 4 inches over roofing surface. Return and break edges.

PART 3 EXECUTION

3.1 INSTALLATION

A. Hem all flashings edges 1/2-inch. Lock and seal all joints other than expansion joints. Neatly form joints and seams with surfaces free from waves and buckles. Do not solder prepainted, metallic coated steel and aluminum sheet. Flashing joints shall have a minimum 4-inch overlap with weld/solder or mechanical fastening with sealant.

B. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant (concealed within joints). Conceal expansion joints within the system.

C. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams filled with non-skinning butyl sealant concealed within joints.

D. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate silicone elastomeric sealant to comply with SMACNA standards.

E. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

F. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

G. Fabricate metal copings and secure by screws and clips as detailed. Screw coping at 18-inches o.c., on the inside of the curb through the skirt. Metal ends shall lap at least 3-inches and shall have plastic cement between the layers of metal. Do not screw through laps.

3.2 FIELD QUALITY CONTROL

A. Refer to Division 1 Section “Quality Control” for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.3 PROTECTION

A. Protect all metal work from damage during the progress of construction. Remove damaged material and replace with new.

END OF SECTION

PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

B. Related Sections include the following:

1. Division 21 Sections specifying fire-suppression piping penetrations.

2. Division 22 and 23 Sections specifying duct and piping penetrations.

3. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.2 PERFORMANCE REQUIREMENTS

A. Products:

1. Provide products that upon curing do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

2. When intumescent products are used, provide products that do not contain sodium silicate or any other water soluble intumescent ingredient in the formulation.

3. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.

4. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.

5. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur. Such devices shall be:

a. Capable of retrofit around existing cables.

b. Designed such that two or more devices can be ganged together.

c. Maintenance free such that no action is required to activate the smoke and fire sealing mechanism.

6. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.

7. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words "Chase Wall Optional."

8. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standards, ASTM E1966, or ANSI/ UL 2079.

9. Provide penetration firestop systems, fire-resistive joint systems, or perimeter fire barrier systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL1479 for penetrations and ANSI/UL2079 for joint systems with published L-Ratings for ambient and elevated temperatures as evidence of the ability of firestop system to restrict the movement of smoke.

10. Provide T-Rating Collar Devices tested in accordance with ASTM E814 or ANSI/UL1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.

11. Provide moisture-curing products where inclement weather or greater than transient water exposure is expected.

B. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers, and smoke barriers.

2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.

C. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

a. Penetrations located outside wall cavities.

b. Penetrations located outside fire-resistance-rated shaft enclosures.

3. L-Rated Systems: Provide firestop systems with L Ratings tested in accordance with ANSI/UL1479 (substitute ANSI/UL2079 for joints). For each 100 sq ft (9.3 m2) area, the total cumulative leakage of all firestop systems shall not exceed 50 CFM (0.024 m3/s).

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

E. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as determined per ASTM E84, and that are paintable products that shall be finished to a smooth surface, flush with adjacent surfaces.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product Data: For each type of product required.

C. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

1. Types of penetrating items.

2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.

3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

E. Qualification Data: For Installer.

F. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

G. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer with commercial experience, who is certified, licensed, and FM Global approved in accordance with FM Global 4991, "Approval of Firestop Contractors," or Certified by UL as a Qualified Contractor. A manufacturer's willingness to sell its firestopping products to Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

B. Certified and licensed company names and contact information for Oregon.

1. PCI ISSD/ Randy Johnson 503-519-4084

2. Hudson Bay / Aaron Garcia 503-545-3367

3. Western Partitions / Cody Rubric 503-519-4339

4. PCI Interior division / Colin McCool 360-772-2747

5. ICON (Insulation Contractors) / Alan Smith 360-823-1390

C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:

a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in its "Fire Resistance Directory."

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Contractor shall schedule a pre-installation conference with the building inspector to review proposed fire stopping products for the Project. Prior to the scheduled meeting the Contractor shall assemble product data for each firestopping assembly with a UL test report for each proposed assembly.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide through-penetration firestop systems appropriate for the penetration condition.

B. Subject to compliance with through-penetration firestop systems (XHEZ) and/or joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Specified Technologies Inc., STI.

2. Hilti Inc.

3. 3M Fire Protection Products.

4. Metacaulk.

5. BioFireshield

6. Spec Seal.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

   a. Slag-/rock-wool-fiber insulation.

   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.

   c. Fire-rated form board.

   d. Fillers for sealants.

2. Temporary forming materials.

3. Substrate primers.

4. Collars.

5. Steel sleeves.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Cast-in-Place Firestop Devices: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket.

C. Intumescent Sealants: Single component intumescent latex formulations containing no water soluble intumescent ingredients capable of expanding a minimum 8 times.

D. Endothermic Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture.

E. Elastomeric Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture and accommodate minimum ±25 percent movement.

F. Firestop Devices: Factory-assembled steel collars lined with intumescent material capable of expanding a minimum 30 times sized to fit specific outside diameter of penetrating item.

G. Fire Rated Cable Pathways: Gangable device modules capable of being retrofitted around existing cables and comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill and requiring no additional action in the form of plugs, twisting closure, putty, pillow, or sealant to achieve fire and leakage ratings.

H. Intumescent Composite Sheets: Intumescent material sandwiched between a galvanized steel sheet and steel wire mesh protected with aluminum foil capable of sustaining a minimum 2,500 lbs (1,134 kg) when subjected to load.

I. Intumescent Putties: Intumescent, non-hardening, water resistant, butyl rubber based putties containing no solvents, inorganic fibers or silicone compounds.

J. Wall Opening Protective Materials: Intumescent, non-curing pads or inserts for protection of electrical switch and receptacle boxes to reduce horizontal separation to less than 24” (610 mm).

K. Intumescent Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film and capable of expanding a minimum 30 times.

L. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

M. Pillows/Bags: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating on all six sides contained in a flame retardant poly bag.

N. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

O. All-Weather Coatings: Moisture curing, single component silicone copolymer elastomeric spray coatings for horizontal surfaces where greater water resistance is required or inclement weather is anticipated.

P. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts.

Q. Firestop Plugs: Re-enterable, foam rubber plug impregnated with intumescent material capable of expanding minimum 10 times with expansion beginning at 350°F (177°C) for use in blank openings and cable sleeves.

R. Fire-Rated T Rating Collar Device: Louvered steel collar system with synthetic aluminized polymer coolant wrap installed on metallic pipes where T Ratings are required by applicable building code requirements.

S. Fire-Rated Cable Grommet: Molded two-piece grommet made from plenum grade polymer with a foam inner core for sealing cable penetrations up to 0.53 in. (14 mm) diameter.

T. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag)

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.

3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes, ready to be painted.

3.4 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal, vinyl or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."

2. Contractor's name, address, and phone number.

3. Through-penetration firestop system designation of applicable testing and inspecting agency.

4. Date of installation.

5. Through-penetration firestop system manufacturer's name.

6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Systems shall be UL-classified and listed in UL's "Fire Resistance Directory" under product Category XHEZ.

1. Firestop Systems with No Penetrating Items.
2. Firestop Systems for Metallic Pipes, Conduit, or Tubing.
3. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing.
4. Firestop Systems for Electrical Cables.
5. Firestop Systems for Cable Trays.
6. Firestop Systems for Insulated Pipes.
7. Firestop Systems for Miscellaneous Electrical Penetrants.
8. Firestop Systems for Miscellaneous Mechanical Penetrants.
9. Firestop Systems for Groupings of Penetrants.

END OF SECTION

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of building sealants for weatherproofing and joint filling including, but not limited to:

1. Perimeter of door and relite frames.

2. Penetrations of mechanical, electrical, and roof drainage equipment.

3. Construction and expansion joints.

4. Miscellaneous sealant products used throughout job.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Federal Specifications (FS).

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.

2. Conduct field tests for each kind of sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.

4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

a. Test Methods:

(1) Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix XI in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

(2) ASTM C794-06 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

b. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product data from manufacturers for each joint sealant product required.

C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

G. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

H. Installer’s experience qualifications.

I. Sample warranty.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40°F.

2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.9 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period. Include repair and replacement of defective work, such as leaks, failure of material, loss of adhesion, running of compound, or staining of adjacent work.

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

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period:

a. 20 years from date of Substantial Completion for silicone sealants.

b. 10 years from date of Substantial Completion for polyurethane sealants.

c. 10 years from date of Substantial Completion for Silyl-Terminated-Poly-Ether (STPe) sealants.

d. 5 years from date of Substantial Completion for acrylic latex sealants.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.

2. Disintegration of joint substrates from natural causes exceeding design specifications.

3. Mechanical damage caused by individuals, tools, or other outside agents.

4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed in Paragraph 2.3.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Provide custom colors of exposed joint sealants to match Architect's samples.

2.3 ELASTOMERIC JOINT SEALANTS

A. Sealant 1:

1. One-part neutral cure medium modulus moisture curing silicone, FS TT-S-00230C, Type 2, Class A, or ASTM C920, Type S, Grade NS, Class 25. Uses NT, M, G, A, and O, and capable of withstanding movement of 50% in extension and compression in service.

2. Products:

a. Dow Corning "795."

b. Pecora "895 NST" (non-staining technology).

c. Tremco "Spectrem 2."

B. Sealant 2:

1. One-part low modulus moisture curing silicone, FS TT-S-00230C, Type 2, Class A, TT-S-001543A, Class A, or ASTM C920, Type S, Grade NS, Class 100/50. Uses NT, M, G, A, and O, and capable of withstanding movement of 100% in extension and 50% in compression in service.

2. Products:

a. Dow Corning "790."

b. G.E. "Silpruf SCS 2000."

c. Pecora "890 FTS" (field-tintable, non-staining technology).

d. Tremco "Spectrem 1."

C. Sealant 5:

1. One-part mildew resistant silicone sealant, FS TT-S-00230C, Class A, TT-S-1543A, Class A, or ASTM C920, Type S, Grade NS, Class 25. Uses NT, A and as applicable to non-porous joint substrates indicated, O, formulated with fungicide, intended for sealing

interior joints with non-porous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

2. Products:

a. Tremco "Tremsil 200."

b. Pecora "898."

D. Sealant 6:

1. One part, neutral cure sealant, designed for adhering to low energy surfaces common in sheet or peel and stick weather resistant barriers.

2. Products:

a. Dow Corning “758 Silicone Weather Barrier Sealant.”

b. PROSOCO, Inc., “R-Guard AirDam” STPe sealant.

c. Henry “HE925-BES Sealant” STPe sealant.

E. Sealant 7:

1. One-part acrylic latex sealant, ASTM C834.

2. Products:

a. Tremco "Acrylic Latex 834" paintable caulk.

b. Pecora "AC-20" paintable caulk.

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; compatible with joint substrates, sealants, primers and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers:

1. Preformed, compressible, resilient, non-staining, non-waxing, non-exuding strips of flexible plastic foam of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2. Material: Bi-cellular extruded polyolefin foam material consisting of a network of both open and closed cells and with nonabsorbing outer skin, non-outgassing when punctured, ASTM C1330, Type B.

3. Products:

a. Nomaco "SOF ROD."

b. Backer Rod Manufacturing, Inc., “TITAN FOAM.”

C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant substrate tests and field tests.

B. Cleaners for Non-Porous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent non-porous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Sanded Joints: Clean masonry sand, ASTM C144.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil free compressed air.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, glazed surfaces of ceramic tile, and other non-porous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: For joint sealants as applicable to materials, applications, and conditions indicated, per ASTM C1193.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross sectional shapes, depths, and surface bond area of installed sealants relative to joint widths that allow optimum sealant movement capability.

a. Do not leave gaps between ends of joint fillers.

b. Do not stretch, twist, puncture, or tear joint fillers.

c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

2. Install sealants at dynamic sealant joints to a uniform cross-sectional shape with depths relative to joint widths that allow optimum sealant movement capability as recommended by sealant manufacturer. This requires a 2:1 width-to-depth ratio with an hourglass configuration after tooling.

3. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths

that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

E. Tooling of Non-Sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

2. Provide flush joint configuration, per Figure 5B in ASTM C1193, where indicated.

3. Provide recessed joint configuration, per Figure 5C in ASTM C1193, of recess depth and at locations indicated. Use masking tape to protect adjacent surfaces of recessed tooled joints.

4. Sanded Joints: Embed clean masonry sand in the exposed surface of joint sealants that occur in masonry construction.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that installations with repaired areas are indistinguishable from original work.

3.6 SCHEDULE

A. Primerless Type Silicone Sealant: Exterior and interior joints in vertical surfaces of concrete and masonry, between metal and concrete, and all other exterior joints not indicated otherwise; penetrations, form tie holes, and toilet room fixtures.

1. Medium modulus type for ±50% joint movement, general building sealing and joints bordering glass: Sealant 1.

a. Sealant 1 is structural silicone and is the only sealant to use for structural glazed insulating glass units, but can also be used where no, or very little movement is expected such as sealing form tie holes, and joints between like-materials that don't expand and contract differently, and are not expansion joints.

b. Where joints are required to be painted, do not use products that cannot be painted.

2. Low modulus type for expansion and control joints with +100% to -50% movement and joints bordering brick, concrete, acrylic sheet or plastic: Sealant 2.

a. Sealant 2 can be used in all locations that Sealant 1 is used, except structural glazing. Sealant 2 must be used in expansion/contraction joints, around toilet room fixtures, and between materials with different coefficients of expansion, i.e., steel/concrete, aluminum/steel, etc.

b. Where joints are required to be painted, do not use products that cannot be painted.

B. Mildew Resistant Silicone: Interior wet areas, Sealant 3.

C. Bedding and Joint Sealant between self-adhering flexible flashing and metal lashing. Sealant 4.

D. Acrylic Emulsion Sealant: Interior joints in field-painted vertical and overhead surfaces; at perimeter of elevator door frames and hollow metal door frames; in gypsum board, plaster, concrete and concrete masonry; and all other interior joints not indicated otherwise: Sealant 5.

END OF SECTION

PREFINISHED STEEL DOOR FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services necessary for the installation of prefinished, shop frbricated, and site assembled steel door frames.

B. Related Sections: Division 8 Sections “Wood Doors,” “Door Hardware,” and “Glazing.”

1.2 REFERENCES

A. REF ASTM A1008M – Standard for cold rolled material.

B. ASTM D2197 - Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.

C. ASTM D2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

D. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

E. ASTM D3361 - Standard Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

F. ASTM B117 – Standard test for salt spray testing.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop Drawings: Indicate frame elevations, reinforcement required, and spacing, location of embosses for hardware, and finish.

C. Manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. Installers: Individuals that are manufacturer “Certified Prefinished Frame Installers” for the installation of site assembled door frames.

B. Frames: Provide all prefinished frames for project from same manufacturer.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products in a dry area off the ground.

B. Accept frames on site in manufacturer's box packaging with identification labels intact. Inspect for damage.

C. Do not open individual boxes until installation is to begin.

1.6 PROJECT CONDITIONS

A. Coordinate the work with frame opening construction, door and hardware installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Timely Industries, A Division of SDS Industries, Inc., 800-247-6242. Web site: www.timelyframes.com.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section “Product Requirements.”

2.2 DOOR FRAMES

A. Frame Material: C-Series, 18 gauge cold rolled steel, for interior frames.

B. Frame Throat Opening: To suit finished wall thickness.

C. Non-rated Frame Profile: “S” Series, 0.9 mm (20 gauge) thick.

D. Frame Casings: Standard steel type, Model TA-8 with 6 mm (1/4 inch) reveal, on steel frames. Fit factory assembled units with MiterGard corner alignment clips.

2.3 ACCESSORIES

A. Silencers: Clear stick-on type.

B. Fasteners: Drywall type.

2.4 FABRICATION

A. Cut, notch and fabricate frames at manufacturer's facility.

B. Provide minimum 14 gauge hinge reinforcement plate, tapped for machine screws supplied with hinges. Mechanically attach hinge plate to hinge emboss on frame.

C. Casing Clips: Fabricate frames with factory applied, heat treated clips to prevent deflection in the clip upon application or removal of casing. Attachment clips may not be of same material as frame.

D. Provide notches and tabs or stops (or both) for positive alignment of frame parts at all corners.

E. Notch mullions to provide tight joints.

F. Provide manufacturer’s standard mullion brackets for positive connection of frame and mullion parts.

G. **Provide manufacturer’s standard steel glass stop, factory cut to exact length.**

H. **Provide insert channel full width of light for sidelight and borrowed light frames installed on finish floor. Provide full width head channel for ceiling height units.**

I. **Provide fixed type transom bars with same profiles as jamb and head.**

J. Prepare frames for ASA 4 7/8 inch (124 mm) strikes, where required. Provide minimum 1/4 inch (6.35 mm) depth of threads in factory tapped screw holes.

K. Provide corner alignment clips.

L. Silencers: Provide three (3) single silencers for single doors on strike side of frames.

2.5 FINISH

A. Frame Units: Prefininshed with factory applied impact resistant, polyester baked enamel finish.

B. Steel Casing: Prefinished with factory applied impact resistant, polyester baked enamel finish.

C. Custom Colors: As selected by Architect from manufacturer's full color range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify acceptability of existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install frames in accordance with manufacturer's requirements.

B. Install prefinished frames near end of the project after completing wall painting and wall coverings.

C. Install frames using certified installers.

D. Coordinate installation of glass and glazing in glazed units.

E. Coordinate installation of frames with installation of hardware specified in Division 8 Section "Door Hardware," and doors in Division 8 "Wood Doors."

F. Touch-up blemishes on finished frames.

3.3 CLEANING

A. Upon completion, perform cleanup, remove surplus materials, rubbish, tools and equipment in accordance with Division 1 Section "Closeout Procedures."

3.4 PROTECTION

A. Protect installed product from damage during construction.

B. Repair damage to adjacent materials caused by door frame installation.

END OF SECTION

WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor, material, equipment and services necessary to furnish and install wood flush face doors, and stile and rail wood doors.

B. Related Sections:

1. Division 8 Sections “Prefinished Steel Door Frames” and “Door Hardware.”

2. Division 9 Section “Painting.”

1.2 REFERENCES

A. Architectural Woodwork Quality Standards (AWS): Architectural Woodwork Standards, Guide Specifications and Quality Certification Program, Edition 1, adopted and published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada and The Woodwork Institute.

B. Wood Door Manufacturers Association (WDMA).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product data for each type of door, including details of core and edge construction, trim for door lite openings and louvers.

C. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, requirements for veneer matching and other pertinent data. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to lite and louver openings.

D. Samples for verification: Corner sections of doors approximately 12-inches square with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required.

E. Certification: Manufacturer’s letter of certification of specification compliance.

1.4 QUALITY ASSURANCE

A. Flush Doors: Doors shall comply with WDMA Industry Standard I.S. 1A-11 Architectural Wood Flush Doors and AWS Quality Standards. Any door not meeting these standards shall be replaced without cost to the Owner.

1. Solid Core Doors: Fabrication shall comply with AWS PC-5 or PC-7 construction for non-rated doors.

B. Stile and Rail Doors: Doors shall comply with WDMA Industry Standard I.S. 6A-11 Architectural Stile and Rail Doors and AWS Quality Standards. Any door not meeting these standards shall be replaced without cost to the Owner.

C. Doors shall bear a temporary tag including the manufacturer's name with full description of face veneer assembly, species, cut, match, door type, elevation, size, hardware machining information, providing for total reconciliation with their submittals and the wood door specification. Such tag shall be affixed to the top of the door.

D. Manufacturer to provide a statement of certification as to their intended full compliance with the wood door specification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect during transportation handling and storage from surface damage, moisture and soiling. Doors hung and protected as soon as possible after delivery.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Provide manufacturer's full lifetime warranty of door construction and original installation including rehanging and refinishing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product Manufacturers:

1. Ampco Products, Inc.

2. Eggers Industries.

3. Island Precision Architectural Woodwork.

4. Lynden Door.

5. Marshfield Door Systems, Inc.

6. Oshkosh Architectural Door.

7. Pacific Architectural Wood Products.

8. Vancouver Door Company.

9. VT Industries.

10. Oregon Door.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MANUFACTURED UNITS

A. Solid Core Doors:

1. WDMA Door Aesthetic Grade: Premium.

2. WDMA Performance Duty Level: Extra heavy duty.

a. Hinge Loading: WDMA TM-8, 1990, 550 lbs.

b. Door Face, Blocked Particleboard: 700 lbs.

c. Verticle Door Edge: 550 lbs.

d. Horizontal Door Edge: 300 lbs.

3. Particleboard core, ANSI A208.1, Grade LD-2, flush face, no added urea-formaldehyde and manufactured from FSC certified wood.

a. Blocking: Provide hardwood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

4. Premium grade five-ply and seven-ply architectural doors with stiles and rails bonded to the core by means of a thermal setting (hot press) adhesive and sanded prior to assembly of face veneers.

5. All doors have double banded laminated stiles without finger joints in outer band and outer band at least 1/2-inch thick. Outer band same species as face veneer, bonded to the core. Laminated stile1-3/8-inches minimum thickness after trim.

6. Door thickness 1-3/4-inches.

7. WD-2, Veneers:

a. Doors with Transparent Finish:

(1) Premium face (Grade AA, edge glued joints), plain sliced, center and book matched maple.

(2) Face veneers tight and smoothly cut, joints parallel to the edges of the door, and without sharp contrasts in color or grain.

(3) Individual pieces of veneer forming the face veneer edge glued with a thermosetting adhesive. 6-inch minimum flitch width per AWS.

(4) Minimum 1/50-inch veneer thickness at 12% moisture content before sanding at project site.

(5) Double doors to be matched.

b. Doors with Paint Finish:

(1) Premium grade, MDO faces.

(2) Surface of the door must be sound and provide a smooth surface without any imperfections that will show through the finish.

B. Stile and Rail Doors:

1. WDMA Door Aesthetic Grade: Premium.

2. WDMA Performance Duty Level: Extra heavy duty.

3. WD-2, Veneer Grade, Cut, Species, and Match: AA, plain sliced, balanced slip matched, maple, clear finish.

a. Face veneers tight and smoothly cut, joints parallel to the edges of the door, and without sharp contrasts in color or grain.

b. Individual pieces of veneer forming the face veneer edge glued with a thermosetting adhesive.

c. Minimum 1/50-inch veneer thickness at 12% moisture content before sanding at project site.

4. Door Type: glass.

5. Door Thickness: 1-3/4-inches.

C. Lites and Louvers:

1. See door patterns scheduled.

2. Provide flush style matching wood stop beads for all openings unless detailed otherwise.

3. Wood flat slat or sightproof louvers unless otherwise noted.

4. Comply with building code requirements for handicap accessibility.

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

C. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Openings: Cut and trim openings through doors in factory.

E. Lite Openings: Trim openings with moldings of material and profile indicated.

F. Glazing: Factory install glazing. Comply with applicable requirements in Division 8 Section "Glazing."

G. Louvers: Factory install louvers in prepared openings.

2.4 SHOP PRIMING

A. Stain/Transparent Finish: After doors have been prepared to receive hardware, shop seal faces and edges of doors for stain/transparent finish as specified in Division 9 Section “Painting.” Seal all four edges, edges of cutouts, and mortises with first coat of finish.

B. Doors with Opaque Finish: Shop prime doors with one coat of enamel primer for wood specified in Division 9 Section "Painting." Seal all four edges, edges of cutouts, and mortises with primer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Fit with 1/8-inch clearance in frames, head and jambs, 3/16-inch clearance over saddles and thresholds, and 3/8-inch clearance over floor or floor coverings at openings without saddles and thresholds. Bevel lock and hinge stile edges 1/8-inch in 2-inches to operate without binding. Undercut when specially noted on the Drawings or as scheduled. Fit for other clearances when required by special details, hardware, or floor coverings as approved by Architect.

B. Accurately locate surface-mounted hardware on doors by dimension, jig, and template. Pre-drill all screw fastening device holes.

END OF SECTION

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services for the installation of access panels in walls and ceilings for access to concealed equipment and closed spaces as detailed.

B. Related Sections: Refer to Divisions 21, 22 and 23 for mechanical equipment access requirements.

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings and manufacturer's instructions submitted to Architect for review before ordering. Show installation details, list all required parts and accessories, and color or finish options unless special finish is specified. Indicate required modifications to standard products required for this installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product Manufacturers:

1. Acudor.
2. Access Panel Solutions, Inc.
3. Babcock-Davis.
4. Cierra Products.
5. Dur-Red Products.
6. Elmdor.
7. Inland-Ryerson/Milcor.
8. J.L. Industries.
9. Miami-Carey.
10. Nystrom.

B. Other Manufacturers: Submit substitution requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MANUFACTURED UNITS

A. Style and model as applicable to wall or ceiling finish.

B. Minimum 24-inches x 24-inches ceiling access panels and 18-inches x 18-inches wall access panels. All access panels shall open a minimum of 90 degrees. Minimum 24-inches x 24-inches for crawl access, larger sizes as detailed or suitable for maintenance access to concealed equipment and devices.

1. Acudor “UF-5500,” non-rated, universal wall-ceiling, flanged type.

C. Furnish cylinder locks to match brand and keyway design of cylinder locks specified in Division 8 Section Door Hardware. Fasten door panels to frames with continuous hinge, supply access doors and panels with factory-applied white rust-inhibitive prime coat.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install all panels in accordance with manufacturer's standard specifications and recommendations.

1. Provide access panels in non-accessible walls and ceilings wherever there is equipment or a device that needs maintenance (valves, dampers, junction boxes, terminal units, etc.). Locate access panels directly under or in front of the equipment or device to enable service personnel to reach and service equipment. Panels shall be sized to accommodate the largest piece of equipment. The location of access panels shall be designed to ensure the location is accessible for maintenance and operation requirements.

2. Provision of access shall be provided to all maintained equipment such as fire dampers, smoke dampers, valves, relays, resets, monitor devices, etc. Coordinate elements being installed by multiple trades to ensure clear access to elements requiring maintenance.

B. Verify that reinforcing, backing or blocking required for solid anchorage is in place. Furnish with screw type fasteners long enough to anchor into supports.

C. Furnish and install free from damage and in perfect operating condition.

END OF SECTION

ROLLING COUNTER DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services required for the installation and operation of metal slat roll-up counter doors in locations as scheduled and detailed.

1.2 REFERENCES

A. National Electrical Manufacturers Association (NEMA).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product data for each type and size of rolling counter door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:

1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.

2. Summary of forces and loads on walls and jambs.

3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.

C. Shop drawings including the following:

1. For special components and installations not dimensioned or detailed in manufacturer’s data sheets.

2. Wiring Diagrams: Detail wiring for power and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.

D. Installer certificates signed by manufacturer certifying that installers comply with specified requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the coiling counter door manufacturer for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain rolling counter doors, operators, and controls through one source from a single manufacturer.

C. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Specification is based on CornellCookson, Inc., ESC10 behind jamb, motorized rolling counter doors.

B. Other Approved Manufacturers: Overhead Door Corporation, McKeon Door Company.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MANUFACTURED UNITS

A. Counter Doors:

1. Closure curtain fabricated from 22 gauge No. 10 galvanized steel slat, with tubular footpiece containing a thumb-turn operated locking device. Box section steel guides.

2. Finish: Curtain and hood finished with factory-applied thermo-setting polyester.

3. Curtain coils around a steel tube barrel of not less than 4-inches in diameter containing a helical torsion spring capable of counter-balancing the curtain weight. Coil enclosed in 24 gauge galvanized steel hood with removable access door on panel.

4. Finish: Powder coating system with low coefficient of friction wear-resistance to include a galvanized base coat consistent with ASTM A-653, Zirconium treated and bonderized for prime coat adhesion, with a RAL powder coat color as selected by Architect baked-on polyester powder coat rust inhibiting paint with a minimum 2 mils (0.0508 mm) cured film thickness

5. Power Unit:

a. Equipped with direct electrical hook-up (1/3 HP, 115V, single phase) and manual push-up emergency operation. Include rotary limit switch to set open and close positions. Motor controller with NEMA Type 1 three position key operated switch located in remote location, providing "Open-Close-Stop" operation. Motor provided with an enclosure and mounted in a position to clear obstructions.

b. Manufacturer: Cookson "Model 11" power unit, "Midget Operator."

6. Safety Edge:

   a. Wireless safety switch provided on the footpiece for reversal of direction when hitting an obstruction while closing door. Wired safety edges are unacceptable.

   b. Manufacturers: Cookson "Phantom Featheredge."

PART 3 EXECUTION

3.1 INSTALLATION

A. Doors shall be installed by the manufacturer or manufacturer's authorized representative.

B. Install plumb and true, securely fasten to the structure, and adjusted for operation. Include installation of control system where required.

C. Provide Owner instruction for door operation and maintenance.

END OF SECTION

BULLET-RESISTANT TRANSACTION WINDOWS

PART 1 GENERAL

1.1 SUMMARY

A. Material, equipment, labor and services necessary for the installation of extruded aluminum transaction windows.

B. Related Section: Division 13 Section “Bullet Resistant Fiberglass.”

1.2 REFERENCES

A. Aluminum Association (AA) Standards.

B. American Architectural Manufacturers Association (AAMA).

C. American National Standards Institute (ANSI).

D. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Manufacturer's technical product data, recommendations and standard details for aluminum window units, including certified test laboratory reports as necessary to show compliance with all requirements of this Specification.

C. Guarantee, as described below.

1.4 GUARANTEE

A. Guarantee Work against defective materials or workmanship for a period of two years after Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Transaction Windows: Armortex.

B. Other Manufacturers: Submit Substitution Request prior to bid date in accordance with Division 1 Section “Product Requirements.”

2.2 MATERIALS

A. Transaction Windows: Armortex “Aluminum Transaction Window with Speaker” model WI-TW-AL-SP.

B. All framing members shall be extruded aluminum sections formed of 6063-T5 alloy and temper. All members true to detail and free from defects impairing appearance, strength or durability.

2.3 FABRICATION

A. Window Construction:

1. Constructed of bullet resistant extruded aluminum frame on top and 2 sides.

a. Speak Hole: Armortex “Acrylic Speaker.”

2. Standard base construction is layered particle board with plastic laminate covering.

a. Base armored with bullet resisting material consistent with threat level.

b. Deal tray to be stainless steel with bullet-trap below. Bullet-trap bullet resistance to be consistent with threat level.

(1) Product: Insulguard Security Products “Counter Recessed Deal Tray with Bullet Trap,” notched on each side to allow recessed glazing material.

(a) Tray Size: 14” x 8” x 1 ½”

B. Window Glazing:

1. Glazing materials shall be of a type listed by Underwriters Laboratories, Standard 752 Level 2 bullet resistance.

2. Product: Armortex “Bullet Resistant Glazing.”

C. Finish: Exposed aluminum members shall be free of scratches and surface blemishes, be caustic etched, and given an Architectural Class I clear anodized coating per AA-M12C22A41.

PART 3 EXECUTION

3.1 INSTALLATION

A. Set all members accurate to line and detail, aligned with building lines using approved fastenings and anchors to supporting structures. Use concealed mechanical fastenings and screws to make joints and assemble sash and frame systems. No visible screws or rivets without specific approval.

B. Protect aluminum from galvanic attack where in contact with dissimilar metals by approved paints or tape.

3.2 PROTECTION

A. Protect aluminum finishes during installation, glazing and after erection from stains, scratches, and other finish damage. Thoroughly clean aluminum surfaces using approved wax cleaners, soap and water; do not use abrasives, strong alkaline or acid cleaners on aluminum. Protection from subsequent work and final cleaning as specified in Division 1.

END OF SECTION

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Furnish and install all door hardware as specified within this Section. Do not, however, construe the following specification as complete in every detail. Furnish all items classified as door hardware and necessary to complete construction.

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. If requested by the Architect, furnish properly labeled hardware samples within three weeks following award of the Contract. These samples may be retained by the Architect until completion of the job. All delivered hardware must conform to the approved samples.

C. Schedule of Hardware:

1. Format: Comply with scheduling sequence and vertical format in DHI's (Door and Hardware Institute) "Sequence and Format for Hardware Schedule". Double space entries and number/date each page. Prepare the Schedule of Hardware as follows:

   a. List each opening, location, door size, door hand, door and frame material, door label, manufacturer's number and finish.

   b. Any deviation in hardware listed from that specified must be approved by the Architect in writing prior to Bid Opening.

2. Deliver copies of this schedule to the Architect for review.

D. Manufacturer Information: Provide manufacturer's technical product data in the form of catalog cut sheets, clearly marked for each hardware item. Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

E. Templates: Furnish templates to metal door and frame suppliers within one week from receipt of approved hardware schedule and verification at the Preconstruction Meeting.

F. Keying Schedule: Detailed keying instructions and diagram and index, detailing Owner's final keying instructions resulting from the Keying Conference.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Door Hardware Supplier:

   a. Provide services of an AHC or DAHC (Architectural Hardware Consultant) member of Door & Hardware Institute with the technical experience and availability for consultation with the Architect, Owner and Contractor.

b. Hardware supplier shall have and maintain a factory direct status with all manufacturers specified or approved during the course of the project.

c. The door hardware consultant shall:

(1) Be an employee of supplier.

(2) Be knowledgeable on local, state, and federal life safety fire codes, and accessibility codes and requirements to assist the Architect when necessary.

(3) Assist in developing the keying schedule by meeting with the Owner and Architect, and make at least two job site inspections and one final inspection to ensure that all hardware has been properly installed according to the manufacturer's directions.

(4) Notify the door closer installer for final adjustment of door closers prior to the consultant's final inspection.

2. Contractor: Employ an experienced worker to receive, supervise, and distribute hardware at the building site, and provide a locked room with temporary shelving for hardware.

3. Distributor: Provide hardware from a factory authorized distributor. Only those manufacturers specified or approved in writing prior to bidding are acceptable. All components of each hardware item shall be by the same manufacturer.

4. Hardware Installer: Make final adjustments to all door closers.

B. Regulatory Requirements: All hardware shall comply with applicable local and state fire and current building codes.

C. Pre-Construction Meeting: After receipt of the Architect-reviewed hardware schedule, conduct a final "hardware function" coordination meeting with the Owner, Architect, and hardware consultant. Do not release hardware templates to door fabricators until final resolution of the hardware coordination meeting.

D. Keying Conference: Conduct a keying coordination meeting with the Owner and Architect. Incorporate keying conference decisions into a keying schedule for review and approval, including but not limited to:

1. Preliminary key system schematic diagram.

2. Requirements for key control system.

3. Address for delivery of keys.

4. Index of each key set to unique door designations.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver all door hardware to job site unless directed otherwise. Each item shall be properly wrapped in its original factory shipping carton, labeled, and numbered for the opening for which it is intended. All items shall be shipped from the factory to the hardware supplier for final checking before sending to job site.

B. Include all necessary screws, bolts, or other fastenings of suitable size and type to securely anchor in position, and harmonize with the hardware material and finish. Furnish where necessary with sex bolts, toggle bolts, expansion shields or other approved anchors according to the material to which it is applied and recommended by the manufacturers.

1.5 WARRANTY

A. All hardware shall carry a factory warranty for a minimum of one year after Substantial Completion that hardware is free from defects in workmanship and material. Hardware must be installed exactly to the manufacturer's printed instructions to prevent voiding the warranty. Provide a 3 year material and labor warranty for exit devices and 10 year material and labor warranty for closers.

B. Provide factory order numbers to the Owner/GC for hardware warranty purposes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product Manufacturers:

1. DON: Don-Jo Manufacturing.

2. IVE: Ives.

3. LCN: LCN.

4. SCH: Schlage.

5. VON: Von Duprin.

6. ZER: Zero.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Butt Hinges: 1-1/2 pair minimum per door unless scheduled otherwise.

B. Locks and Latches: Verify operation, hand of doors, and function for each opening as scheduled.

C. Keying:

1. It shall be mandatory that keying be done by the lock manufacturer for security, Owner's convenience, and permanent keying records. In the event any keying security procedure is violated, replace all locks, cylinder units, padlocks, cylinders, etc., at no additional expense to the Owner.

2. Provide manufacturer's standard keyway with standard cylinders except where interchangeable core cylinders are specified. Interchangeable core cylinders to have temporary construction cores.

3. Furnish two keys with each lock, and five master keys. Keying and master keying schedule as established by the Owner.

4. All master keys and keying transcript to be sent by registered mail from the factory to the Owner. This procedure is mandatory.

D. Closers: Verify hand of door, degree of opening, frequency of use, and head condition. Furnish cast iron body type only.

E. Silencers: Furnish in number and type to protect finishes wherever doors or hardware thereon will strike adjacent surfaces and materials. Furnish 3 rubber silencers for metal door frames that are not equipped with gaskets.

F. Hardware Finishes: As specified below in the Schedule. Verify all finishes on the Schedule and at the Site.

PART 3 EXECUTION

3.1 INSTALLATION

A. Locate and place hardware on work accurately using templates when required. Install permanently using proper nails, screws or bolts, matching finish of hardware. Remove and place in original packages all hardware after setting to permit application of finishes and reinstall when finish application is complete. Deliver any adjusting tools to Owner properly tagged and identified.

B. Properly wrap all hardware subjected to hand usage during construction for protection. Replace hardware that has damaged finish.

C. Butt Hinges: Install top hinges 5-inches from head of frame or door top to top of hinge. Bottom hinge 10-inches from finished floor to bottom of hinge. Center intermediate hinges between top and bottom hinges.

D. Locks and Latches: Install 38-inches to center line of knob locks and latches.

E. Exit Devices: Mount according to manufacturer's instructions at 38-inches.

F. Deadlock: Install 48-inches to center line of deadlock. Vary as necessary to avoid conflict with door pulls, etc.

G. Door Pulls and Push Plates: Install 42-inches to center of grip for door pulls and push/pull bars. 48-inches to center line of push plates.

H. Thresholds: Set in bed of silicone sealant. Thresholds requiring additional support, set in bed of non-shrink grout.

I. Door Closers: The maximum force to open doors shall not exceed 8-1/2 lbs. for exterior hinged doors and 5 lbs. for interior hinged doors.

3.2 SCHEDULE

HW SET: 01

FOR USE ON DOOR #(S):
001— A 003— A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
1	EA	SURFACE CLOSER	4011 WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
			SILENCERS PROVIDED WITH TIMELY FRAME		

HW SET: 02

FOR USE ON DOOR #(S):
005— A 011— A 012—A 013—A 023—A 024—A
025— A 140—A 141—A 143—A 153—A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
			BALANCE OF EXISTING HARDWARE TO REMAIN		

HW SET: 03

FOR USE ON DOOR #(S):
007— A 008—A 023—B 101— A 102— A 103— A
104— A 104— B 109— A 110— A 113— A 115— A
117— A 134—A 136—A 149—A 156—A 157—A
158—A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50PD RHO	626	SCH
			BALANCE OF EXISTING HARDWARE TO REMAIN		

DOOR HARDWARE

HW SET: 04

FOR USE ON DOOR #(S):
016— A 159—A 160—A 161—A

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE W/DEADBOLT	L9453P 06A L583-363	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
			SILENCERS PROVIDED WITH TIMELY FRAME		

HW SET: 05

FOR USE ON DOOR #(S):
106— A 106— B 111—A 112— B 114— A

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4011 WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR65	GRY	IVE
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
			POWER SUPPLY - WORK OF DIVISION 28		

HW SET: 06

FOR USE ON DOOR #(S):
112— A

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4111 EDA WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS13	626	IVE
3	EA	SILENCER	SR65	GRY	IVE
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
			POWER SUPPLY - WORK OF DIVISION 28		

HW SET: 07

FOR USE ON DOOR #(S):
114—B
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4011 WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS13	626	IVE
3	EA	SILENCER	SR65	GRY	IVE
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY POWER SUPPLY - WORK OF DIVISION 28		SCH

HW SET: 08

FOR USE ON DOOR #(S):
027— A 116— A 120—A 124—A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO BALANCE OF EXISTING HARDWARE TO REMAIN	626	SCH

HW SET: 09

FOR USE ON DOOR #(S):
127— A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE POWER SUPPLY - WORK OF DIVISION 28		SCH

HW SET: 10

FOR USE ON DOOR #(S):
126– B
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-9850WDC-EO-LBL-CON-SNB	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-9850WDC-NL-OP-110WDLBL-CON-SNB	626	VON
1	EA	RIM CYLINDER	20-022	626	SCH
2	EA	LONG DOOR PULL	9264F 36" 20" O	630-316	IVE
2	EA	SURFACE CLOSER	4111 SCUSH WMS	689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW B-CS	630	IVE
2	EA	MEETING STILE	8193AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
2	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
2	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK PROVIDE RISER DIAGRAMS PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		VON

120VAC TO POWER SUPPLY. HOME RUN FROM POWER SUPPLY TO QEL DEVICE(S) AS FOLLOWS: 200FT/18 AWG, 320FT/16 AWG, 500FT/14 AWG, OR 800FT/12 AWG.

HW SET: 11

FOR USE ON DOOR #(S):
126–D
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1WT 4.5 X 6	652	IVE
1	EA	ELECTRIC HINGE	5BB1WT 4.5 X 6 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A 2 1/2" EO RX CON	626	SCH
1	EA	SURFACE CLOSER	4011 WMS	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
			POWER SUPPLY - WORK OF DIVISION 28		

CLAD DOOR. COORDINATE HARDWARE WITH ARCHITECTURAL DETAILS.

HW SET: 12

FOR USE ON DOOR #(S):
130— A 133—A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PULL PLATE	8302 6" 4" X 16" G	630AM	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630AM	IVE
1	EA	SURFACE CLOSER	4011 WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 13

FOR USE ON DOOR #(S):
135—A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4111 EDA WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR65	GRY	IVE
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
			POWER SUPPLY - WORK OF DIVISION 28		

HW SET: 14

FOR USE ON DOOR #(S):
121—A 162—A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR65	GRY	IVE
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
			POWER SUPPLY - WORK OF DIVISION 28		

HW SET: 15

FOR USE ON DOOR #(S):

004— A	006— A	014—A	015—A	017— A	018— A
019— A	021—A	022—A	023—C	105— A	118— A
118— B	122—A	123—A	134— B	138—A	143— B
148—A	148—B	151—A	152—A	154—A	155—A
163—A	164—A				

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
			EXISTING HARDWARE TO REMAIN		

HW SET: 16

FOR USE ON DOOR #(S):
125—A

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD RHO	626	SCH
			BALANCE OF EXISTING HARDWARE TO REMAIN		

HW SET: 17

FOR USE ON DOOR #(S):
126— A

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX CON	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH WMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	WIRE HARNESS	CON-6W FROM INCOMING POWER SUPPLY		SCH
1	EA	WIRE HARNESS	CON-38P POWER TRANSFER TO ELECTRIFIED HARDWARE		SCH
			POWER SUPPLY - WORK OF DIVISION 28		

HW SET: 18

FOR USE ON DOOR #(S):
126—C

EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1WT 4.5 X 6	652	IVE
1	EA	ENTRANCE W/DEADBOLT	L9453P 06A 2 1/2" EO L583-363	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
			SILENCERS PROVIDED WITH TIMELY FRAME		

CLAD DOOR. COORDINATE HARDWARE WITH ARCHITECTURAL DETAILS.

DOOR HARDWARE

HW SET: 19

FOR USE ON DOOR #(S):
108─ A
EACH OPENING TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE W/DEADBOLT	L9453P 06A L583-363	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

END OF SECTION

DOOR AND HARDWARE INDEX
WOODBURN CITY HALL REMODEL AND HVAC UPGRADE
DECA ARCHITECTURE INC
12/14/2018

MARK #	HW SET #
001— A	01
003— A	01
004— A	15
005— A	02
006— A	15
007— A	03
008— A	03
011— A	02
012—A	02
013—A	02
014—A	15
015—A	15
016— A	04
017— A	15
018— A	15
019— A	15
021—A	15
022—A	15
023—A	02
023—B	03
023—C	15
024—A	02
025— A	02
027— A	03
101— A	03
102— A	03
103— A	03
104— A	03
104— B	03
105— A	15
106— A	05
106— B	05
108— A	04
109— A	03
110— A	03
111—A	05
112— A	06
112— B	05
113— A	03
114— A	05
114—B	07
115— A	03
116— A	08
117— A	03
118— A	15
118— B	15
120—A	08
121—A	14
122—A	15
123—A	15
124—A	08
125—A	16
126— A	17
126— B	10
126—C	18
126—D	11
127— A	09
130— A	12
133—A	12
134— B	15
134—A	03
135—A	13
136—A	03
138—A	15
140—A	02
141—A	02
143— B	15
143—A	02
148—A	15
148—B	15
149—A	03
151—A	15
152—A	15
153—A	02
154—A	15
155—A	15
156—A	03
157—A	03
158—A	03
159—A	04
160—A	04
161—A	04
162—A	14
163—A	15
164—A	15

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services necessary for installation of glass in doors and relites, including all glazing hardware.

B. Examine glass requirements of this project and furnish and install all glass in accordance with the requirements of the Building Code and the US Consumer Product Safety Commission.

C. To the fullest extent possible, all products and materials provided by this Specification Section shall comply the U.S. Department of Transportation, Federal Transit Administration, Buy America Requirements (49 CFR 661), most current annual edition.

1.2 REFERENCES

A. American National Standards Institute (ANSI).

B. American Society for Testing and Materials (ASTM):

1. ASTM C1036, Flat Glass.

2. ASTM C1048, Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

C. Glass Association of North America (GANA), (formerly FGMA) Glazing Manual, Installation Recommendations.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by traditional thickness designations according to ASTM C 1036.

1.4 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product Data: For each glass product and glazing material indicated.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Qualification Data: For installers.

E. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

F. Product Test Reports: For each of the following types of glazing products:

1. Glazing sealants.

G. Structural calculations by a structural engineer registered in the State of Oregon showing that glazing complies with the Building Code.

H. Glass warranties and guarantees.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

C. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.

1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated, as documented according to ASTM E548.

2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.

D. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

1. Use ASTM C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

2. Submit not fewer than four pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

E. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

2. Where glazing units, including ASTM C1038 Kind FT glass are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 WARRANTY

A. Provide a warranty for replacement and reglazing of units that become defective during a two year warranty period, at no cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Glass thicknesses specified are minimum required. Structural calculations required by this Section may require greater thicknesses to comply with local codes. Also, greater thicknesses required where noted on the Drawings.

B. Glass Standards:

1. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

2. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

C. Accessories: Furnish all clips, glazier’s points, blocks, felt, and other items required to set all glass throughout the building.

D. Glazing Tape and Sealants:

1. Glazing Tape:

a. Color: Black.

b. Manufacturers: Norton “Norseal V980.”

E. Elastic Glazing Compound:

1. Sealant, metal sash types.

2. Manufacturers: Dow “Insta Glaze.”

F. GL-1, Clear Float Glass: 1/4-inch minimum thickness clear float glass, glazing quality.

1. Location: Interior relites that are not required by code to be tempered.

G. GL-2, Clear Tempered Glass: 1/4-inch minimum thickness, ASTM C1048 Kind FT (fully tempered) clear float glass, tempered after cutting.

1. Location: Glass in doors and relites that are required by code to be tempered.

H. TDG, Tempered Decorative Glass:

1. 1/4 inch minimum thickness ASTM C1048 Kind FT (fully tempered) clear float glass, with decorative ceramic frit fused to the glass during tempering process. Glass manufactured and certified to FS DD G 001403 and ANSI Z97.1.

2. Texture: Translucent white frit.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine glazing channels, and stops for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Minimum required face and edge clearances.

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

3.2 PREPARATION

A. Clean glazing channels immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Maintain original labels on each piece of glass, naming manufacturer, quantity and thickness. Deliver other glazing material in original containers with original manufacturer's labels attached. Remove labels as soon as possible after installation.

C. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

D. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

E. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

F. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

G. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.4 INTERIOR GLAZING

A. Set glass using elastic glazing compound; apply ample compound in rabbet to bed entire perimeter of glass and place necessary setting blocks; press glass, centered, into rabbet.

B. For lites held in place by stop beads all around, bed beads against glass and bottom of rabbet with compound.

C. Secure bead with countersunk fasteners. Strip surplus compound from both sides of glass at an angle; do not undercut.

3.5 CLEANING

A. Clean and remove all stains and excess glazing compound and sealants from glass, sash, and adjoining surfaces. Washing of glass is specified in Division One.

3.6 PROTECTION

A. Protect all glazing from breakage. Reglaze wherever work or material are defective. Replace all glazing damaged prior to Substantial Completion.

B. Do not apply paint or attach temporary signs or festoons directly to glass faces.

END OF SECTION

PLASTER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services necessary for the patch and repair of existing veneer plaster finishes including transitions to other finishes.

B. Related Sections:

1. Division 6 Section “Rough Carpentry” for wood framing.

2. Division 9 Section “Gypsum Board Assemblies.”

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. ASTM C841, Specification for Installation of Interior Lathing and Furring.

B. Gypsum Association Fire Resistance Design Manual.

C. Northwest Wall and Ceiling Bureau.

D. USG Co. Lathing and Plastering Handbook.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Manufacturer’s product data for gypsum lath and veneer plaster.

1.4 QUALITY ASSURANCE

A. **Fire Resistance Ratings: Comply with fire resistance ratings as indicated, required and approved by the governing authorities and codes. Provide materials, accessories and use application procedures which have been listed and approved by UL, ICC, or tested in accordance with ASTM E119 for type of construction shown.**

B. Field Sample: Using one typical room or representative area of patching selected with Architect’s approval, finish surfaces for review by Architect before completion of work of other areas. After acceptance of completed work in the sample area, use that work as the reference standard to be matched by subsequent completed work. Do not proceed with lathing and plastering until all products and finish samples are approved.

C. Pre-Installation Conference: Prior to starting Work and after application of field sample, arrange a meeting at the Project site with applicator, Architect, and the manufacturer’s representative to review scheduling and application procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prevent the inclusion of foreign materials and the damage of materials by water, breakage, or freezing. Deliver and store materials in original packages until ready for use. Remove and dispose of all packages or materials showing evidence of water or other damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Obtain all components and materials of the lath and plaster system from a single manufacturer, or from producers recommended by the manufacturer, unless otherwise indicated.

B. High-Strength, One-Component Gypsum Veneer Plaster: ASTM C 587, ready-mixed, finish-coat veneer plaster containing mill-mixed, fine silica sand; with a compressive strength of 3000 psi when tested according to ASTM C 472; and formulated for application directly over substrate indicated without use of separate base-coat material. Finish texture shall match existing adjacent texture.

C. Gypsum Lath: ASTM C588, fire rated, UL labeled and ICC approved, 1/2-inch thick. USG "Imperial Plaster Base." Use moisture resistant W/R type in all high moisture areas.

D. Metal Molding On Veneer Plaster: USG "Type 800" bead ("801-A," "801-B") in sizes as required, and "Type 093" zinc control joint.

E. Fasteners: Type W screws or annular ringed nails for wood framing. No. 8 shank, Type W screws or annular ringed nails for wood framing. Type GWB-54, 1-7/8-inch length. ASTM C954, minimum head diameter of 7/16-inch, pan or wafer head, hot-dip galvanized. Bugle head screws prohibited.

F. Accessories: USG "Imperial Tape."

G. Acoustical Insulation: 0.5 to 1.0 lb. density, IBC Class I flame spread index fiberglass batt, 4-inch thickness for studs up to 4-inches deep, 6-inch thick for studs up to 6-inches deep, other thicknesses as noted.

H. Caulking:

1. Non-setting, non-staining, acoustically tested caulking.

2. Manufacturers:

a. A.C. Horn "Vulcatex Thriftube."

b. Tremco gypsum board sealant.

c. USG acoustical sealant.

PART 3 EXECUTION

3.1 PREPARATION

A. Broom clean work areas before starting plaster work. Provide ample ventilation and heat for proper application and curing or drying conditions for plaster. Verify that framing is true and acceptable for lathing and plastering work.

B. For plaster work of all types, maintain continuous work area temperature of 55°F minimum, and 80°F maximum for period of seven days before, during, and eight days following plaster application; heat and ventilation evenly distributed to all areas; with deflectors used to prevent hot-spots and uneven drying defects.

C. Protect all work of other trades while plastering; mask and cover all adjacent finishes subject to damage from plaster. Do not mix plastering materials within the building. Do not discharge plaster waste and water onto finished exterior premises.

3.2 INSTALLATION OF GYPSUM LATH

A. Application of Gypsum Base to Receive Gypsum Veneer Plaster: Comply with ASTM C 844 and with gypsum base manufacturer's written recommendations.

B. Verify that acoustical insulation is in place, where detailed, prior to completing panel installation.

C. Where partitions are sound rated construction, apply caulking sealant to all cut-outs and intersections with adjoining structure as described in Sealant Application, below. This requires that the gypsum lath be cut for loose fit around the partition perimeter leaving a space approximately 1/8-inch wide. Line the inside of equipment recesses with gypsum lath to maintain the integrity of sound rated wall construction.

D. Use gypsum lath of maximum practical length to minimize end joints. Arrange joints on opposite sides of partition walls to occur on different studs and stagger butt joints on the same surface. Where partitions intersect exterior walls, start installation at exterior end to position butt joints as far away from exterior wall as possible. Lath shall be brought into contact but not forced into place with all ends and edges neatly fitted. Use “Floating Interior Angle” application at all ceilings. Bottom edge of gypsum lath on walls shall be a maximum of 1/4-inch above floor.

E. Attach gypsum lath to wood framing supports, fasten 8-inches o.c. on walls. For double fastening method, apply first fastener12-inches o.c. with second fastener in close proximity (2-inches). Fasteners spaced at not less than 3/8-inch from edge and ends of board.

F. While fasteners are being driven, hold gypsum lath in firm contact with underlying supports, fastening from the center of the lath toward ends and edges. Drive fasteners tight, with heads

slightly below surface, taking care to avoid breaking the paper face. Power drive screws at least 1/32-inch deep.

G. Cut lath neatly and fit around pipes, electrical outlets, mechanical work, etc. Remove any loose face paper at cuts and fill holes or openings with quick setting plaster. Where lath appears loose from framing, install second fastener within 1-1/2-inches of first.

H. Finish in every location with metal edge and corner bead unless finishing details are given and edge is covered with molding or trim. Install control joints vertically at corners of door frames, and at a maximum of 30-feet apart on unbroken wall surfaces whether shown on the Drawings or not.

I. Use water-resistant type lath on walls of wet and high moisture areas. Seal all cut ends and openings with recommended sealant.

J. Sealant Application:

1. Partition Perimeter: Apply a 1/4-inch minimum bead of sealant on each side of plates, including those used at intersections with dissimilar wall construction. Immediately install gypsum lath, squeezing sealant into firm contact with adjacent surfaces. Fasten lath as specified.

2. Partition Intersections: Before taping and finishing, seal edges of face layer of gypsum lath abutting intersecting partitions.

3. Openings: Apply a 1/4-inch bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. Caulk sides and backs to seal electrical boxes.

4. Control Joints: Before installing control joints, apply sealant in back of joint to reduce flanking sound path.

3.3 INSTALLATION OF JOINT REINFORCING, VENEER PLASTER

A. Apply tape to all joints by aligning tapes over the joint and lightly pressing along the entire length, then press firmly in place by hand or with steel finishing knife or trowel, taking care to keep taut and not allowing it to sag. Do not overlap tape at intersections.

3.4 APPLICATION OF PLASTER

A. Skilled plasterers shall be used throughout the work. All surfaces rodded true to an even plane and free from humps and declivities, matching existing adjacent texture. Protect all adjoining surfaces by covering with masking tape. Neatness of the plasterer is of paramount importance.

B. Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed at any location on surface.

C. Patching: Check the Drawings and building site to determine areas requiring patching. Wherever patching is necessary or called for, perform this work using materials as specified. Trim areas to be patched to a straight line, vertical or horizontal line. The same materials are to

be used as the material of the adjoining surfaces and finished the same. Exercise care in the finishing of the patched area, to feather and blend to the adjoining surface to produce as invisible a joint as possible.

D. Veneer:

1. Gypsum Veneer Plaster Application: Comply with ASTM C 843 and with veneer plaster manufacturer's written recommendations.

2. After tape is applied and securely in place, apply a butter coat of plaster finish over the joints and trims and allow to thoroughly dry before applying bonding agent and finish plaster coat. Seal all cut ends and openings cut into water-resistant type board with manufacturer’s recommended sealant.

3. Apply bonding agent and allow to dry.

4. Coordinate mixing and application of veneer plaster so that no more material than can be applied in 30 minutes is mixed. Mixing equipment and tools must be kept clean to prevent acceleration from set plaster or other contaminants. Do not retemper. Mix plaster according to the manufacturer’s instructions.

5. Apply plaster to a minimum finish thickness of 1/16-inch to a maximum 3/32-inch over plaster base. Embed joints and fill beads with a tight, thin coat over the entire area, immediately doubling back to full thickness.

6. When surface has become firm, final trowel using water sparingly. Hold trowel flat for smooth finish, or float to desired texture to match existing texture.

END OF SECTION

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services necessary for the installation and finishing of all gypsum board partitions and ceilings on wood framing and furring. Include installation of acoustical insulation.

B. Related Sections:

1. Division 1 Section “Allowances” for attic draft stops.

2. Division 9 Section “Ceramic Tiling” for wall assembly components.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. ASTM C 475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002.

2. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 2005.

3. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2005.

4. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2004.

B. GA-600 - Fire Resistance Design Manual; Gypsum Association; current addition.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Manufacturer’s product data.

1.4 QUALITY ASSURANCE

A. Fire Resistance Ratings:

1. Comply with fire resistance ratings as required and approved by the governing authorities and codes. Provide classification labeled materials, and accessories identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction for the type of construction scheduled.

2. Reference the Drawings for wall and ceiling types that indicate specific testing lab assembly and material requirements.

B. Provide completed assemblies complying with ASTM C 840.

C. All gypsum board products shall be manufactured in the United States of America.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery with installation to minimize storage periods. Deliver in unopened containers, bundles or packages fully identified with the manufacturer's name, brand, type and grade. Protect from weather, soiling and damage.

1.6 PROJECT CONDITIONS

A. Examine the conditions under which the gypsum board is to be installed. Commencement of work establishes acceptance of work conditions.

B. Installation not permitted until a uniform temperature of 55°F to 70°F can be maintained in the building and ventilation provided to eliminate excessive moisture.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed in Paragraph 2.2.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Obtain all components and materials of the gypsum board system from manufacturers recommended and approved by the gypsum board manufacturer, unless otherwise indicated.

B. Gypsum Board:

1. Walls and Ceilings: G-P Gypsum Corporation "ToughRock Fireguard," or USG "Sheetrock Brand Firecode," Type X fire retardant type, 5/8-inch thick, tapered edges, 48-inches wide and in lengths as long as practical to minimize number of joints. UL labeled and ICC approved, ASTM C1396.

2. High Moisture Areas: G-P Gypsum Corporation "DensArmor Plus Fireguard," or USG "Sheetrock Brand Mold Tough Firecode X Core," 5/8-inch thick, Type X fire retardant, moisture resistant ASTM C1178, mildew resistant ASTM D3273, UL SCX labeled and ICC approved.

C. Non-Fire Rated Gypsum Board:

1. Attic Draft Stops: ASTM C1396, 1/2-inch thick, tapered edges, 48-inches wide and in lengths as long as practical to minimize number of joints.

2. Refer to Division 1 Section "allowances" for payment of this work.

D. Ceramic Tile Backing Board:

1. G-P Gypsum Corporation "Dens-Shield Fireguard Tile Backer," 5/8-inch thick, glass mat facings front and back, ASTM C1178, Type X fire retardant, mildew resistant ASTM D3273, UL labeled and ICC approved.

2. USG "Fiberock Brand AR," 5/8-inch thick, fiber reinforced water resistant, ASTM C1278, Type FRX-G fire retardant, mildew resistant ASTM D3273, UL labeled and ICC approved.

E. Liner Board: G-P Gypsum Corporation "Dens-Glass Ultra Shaftliner,"1-inch thick, Type X shaft wall liner ASTM C1396, UL labeled and ICC approved, coated glass mat both facings ASTM C1177, mildew resistant ASTM D3273, beveled edge, lengths as required.

F. Low Wall Reinforcing: NoFlex, 800-720-1994, 14 gauge vertical steel tube welded to 3-inch x 8-inch x 3/8-inch steel base plate, space 4-feet o/c, anchored to concrete floors with three 1/2-inch diameter expansion bolts, 3-1/2-inch embedment.

G. Resilient Channels: ClarkDietrich Building Systems “RC-Deluxe,” 25 gauge galvanized steel, 2-5/8-inches wide, 1/2-inch deep, Type S screw attachment only, no substitutions.

H. Fasteners: Type W screws or annular ringed nails for wood framing, Type GWB-54, 1-7/8-inch length. Parker or six penny (6d) cooler type nails.

I. Joint Treatment: Provide materials from same manufacturer as gypsum board, ASTM C475/C475M.

1. Joint Tape:

a. Gypsum Board: Paper.

b. Tile Backing Panels: As recommended by panel manufacturer.

2. Joint Compound for Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

a. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

c. Use setting-type compound for installing paper-faced metal trim accessories.

d. Fill Coat: For second coat, use drying-type, all-purpose compound.

e. Finish Coat: For third coat (final coat of Level 4 finish), use drying-type, all-purpose compound.

3. Joint Compound for Tile Backing Panels:

a. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

b. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

J. Acoustical Insulation: Friction fit, un-faced, formaldehyde-free fiberglass batt insulation containing at least 25% post-consumer or 50% post-industrial recycled glass. Comply with local code, Class I flame-spread rating of 15 to 25 as tested per ASTM E84, and with ASTM C665, Type I, R-11.

K. Sealant:

1. Non-setting, non-staining, acoustically tested sealant, ASTM C919.

2. Products:

a. Sheetrock Acoustical Sealant by U.S. Gypsum.

b. Acoustical Sealant by Tremco. A black synthetic rubber material suitable for concealed locations only.

c. Sil Pruf, SCS 2000 by General Electric.

L. Fire-rated Acoustic Sealants:

1. CP 601 S Elastomeric Firestop Sealant by HILTI.

2. Fyre Sil by Tremco.

3. Fire Barrier 1000 N/S, 2000 by 3M.

M. Electrical Receptacle Box Putty Pads:

1. Kinetics Noise Control, “IsoBacker.”

2. Hilti, “Firestop Putty Pad CP 617.”

3. STI, “SpecSeal Putty Pad.”

4. 3M, “MPP+.”

N. Trim Accessories:

1. Hot-dip galvanized steel corner beads, edge trim, and control joints, ASTM C1047.

2. Shapes indicated below by reference to Fig. 1 designations in ASTM C1047:

a. Corner bead on outside corners, unless otherwise indicated.

b. LC-bead with both face and back flanges; face flange formed to receive joint compound, provide for edge trim unless otherwise indicated.

c. L-bead with face flange only; face flange formed to receive joint compound, provide where indicated.

d. U-bead with face and back flanges; face flange formed to remain without application of joint compound, provide where indicated.

e. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation Standards: Installation of gypsum board assemblies, ASTM C840.

B. Gypsum Board:

1. Acoustic Insulation: Prior to commencing gypsum board installation, install acoustical insulation where detailed in accordance with insulation manufacturer's installation instructions. Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions. Press blankets firmly in place against the back of one of the layers of gypsum board. Tightly butt ends of blankets, leaving no voids.

2. In areas where gypsum board is called for on the walls and ceiling, install the ceiling first then the wall unless detailed otherwise.

3. Where partitions are sound or fire-rated construction, apply caulking sealant to all cut-outs and intersections with adjoining structure as described in Sealant Application, below. This requires that the gypsum board be cut for loose fit around the partition perimeter leaving a space approximately 1/8-inch wide. Line the inside of equipment recesses with gypsum board to maintain the integrity of sound and fire-rated wall construction.

   a. Install resilient channels according to manufacturer's instructions.

   b. Verify that electrical receptacle boxes have been properly installed in sound rated walls. Electrical receptacle boxes in walls should be spaced a minimum of 24" apart. Boxes on opposite sides of the wall should not be placed in the same stud cavity.

4. Use gypsum board panels of maximum practical length to minimize end joints. Arrange joints on opposite sides of partition walls to occur on different studs and stagger butt joints on the same surface. Where partitions intersect exterior walls, start installation at exterior end to position butt joints as far away from exterior wall as possible. Board shall be brought into contact but not forced into place with all ends and edges neatly fitted. Use "Floating Interior Angle" application at all ceilings. Bottom edge of gypsum board on walls shall be a maximum of 1/4-inch above floor.

5. Attach gypsum board to wood framing supports, fasten 7-inches o.c. on ceilings and 8-inches o.c. on walls. For double fastening method, apply first fastener12-inches o.c. with second fastener in close proximity (2-inches). Fasteners spaced at not less than 3/8-inch from edge and ends of board.

6. While fasteners are being driven, hold gypsum board in firm contact with underlying supports, fastening from the center of the board toward ends and edges. Drive fasteners tight, with heads slightly below surface, taking care to avoid breaking the paper face.

7. Cut board neatly and fit around pipes, electrical outlets, mechanical work, etc. Remove any loose face paper at cuts and fill holes or openings with quick setting plaster. Where board appears loose from framing, install second fastener within 1-1/2-inches of first.

8. Finish in every location with metal edge and corner bead unless finishing details are given and edge is covered with molding or trim. Install control joints vertically at corners of door frames, and at a maximum of 30-feet apart on unbroken wall surfaces.

9. Use water-resistant type board at wet and high moisture areas, including restrooms. Seal all cut ends and openings with recommended sealant.

C. Sealant Application:

1. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

2. Partition Perimeter: Apply a 1/4-inch minimum bead of sealant on each side of plates, including those used at intersections with dissimilar wall construction. Immediately install gypsum board, squeezing sealant into firm contact with adjacent surfaces. Fasten board as specified.

3. Partition Intersections: Before taping and finishing, seal edges of face layer of gypsum board abutting intersecting partitions.

4. Openings: Apply a 1/4-inch continuous bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. Caulk sides and backs to seal electrical boxes.

5. Control Joints: Before installing control joints, apply sealant in back of joint to reduce flanking sound path.

6. In all sound-rated walls, electrical receptacle boxes shall be sealed around the perimeter with acoustical caulk, and all unused knock-out holes shall be plugged with knock-out caps.

   a. Electrical outlet box back putty pads shall be installed on all boxes on both sides of the wall in all walls with a rating of STC 49 or higher. Install pads to the back

of installed electrical boxes, mold to box and fold around conduit cable entering the box.

D. Ceramic Tile Backing Board: Coordinate wall assembly components with Division 9 Section "Ceramic Tiling." Install as a substrate to all ceramic tile on walls. Before starting the installation, verify that all framing supporting ceramic tile is spaced no greater than 16-inches o.c. Install horizontally with end joints over framing members. Secure to framing with screws spaced not more than 8-inches o.c. with 1-inch bugle head Type S High-Low screw.

E. Shaft Wall Erection:

1. Install in accordance with Gypsum Association Fire Resistance Design Manual. Shaft wall 1-hour rated assemblies, designed for a minimum 5 lbs./s.f. loading at mechanical shafts, maximum 1/240 deflection.

2. Position steel tabbed runners at floor and ceiling with the short leg toward finish side of wall and securely attach runners to structure with power driven fasteners at ends and at 24-inches o.c. Cap ends of run with shaftwall studs.

3. Insert coreboard liner panels between floor and ceiling tabbed runners with shaftwall studs between panels.

4. Install full length steel shaftwall studs over shaft wall liner at T-intersections, corners, columns and both sides of closure walls. Suitably frame all openings to maintain structural support for wall.

5. One-Hour Assembly: Apply one layer of 5/8-inch thick Type X gypsum board vertically to the C side of studs with 1-inch Type S gypsum board screws at 12-inches o.c. in studs and runners.

F. Joint Finishing:

1. Level 1, ASTM C840 and GA-214-10: Rough taping permitted only in concealed spaces and service or unfinished areas as scheduled, including gypsum board which will be covered by rigid finish material fully concealing joints and which will not telegraph unevenness.

2. Level 4, ASTM C840 and GA-214-10:

a. Tape joint compound and finishing compound as recommended by manufacturer of gypsum board.

b. Using suitable tool or machine, apply a thin uniform layer of joint compound approximately 3-inches wide to the joint to be reinforced.

c. Center tape over the joint and seat into the compound, leaving sufficient compound under the tape to provide proper bond.

d. Apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories.

e. Touch-up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

f. Use only water resistant materials with moisture resistant type gypsum board.

g. Upon completion of finish sanding to a smooth surface, remove all dust from wall surface. Wipe down the entire wall surface with a damp sponge mop.

h. Apply Level 4 Finish to all exposed paper faced gypsum board, except where Level 1 is allowed.

3. Level 5, ASTM C840 and GA-214-10:

a. Add to Level 4 finish, one finish coat over entire surface, matching texture of existing adjacent walls.

b. Touch-up and sand as needed to produce a surface free of visual defects and ready for decoration.

c. Upon completion of finish sanding, remove all dust from wall surface. Wipe down the entire wall surface with a damp sponge mop.

3.2 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated. In public areas, confirm locations with Architect for visual effect. Frame both sides of joints independently.

1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

2. Fire-Rated Joints: Comply with Gypsum Association GA-234 for control joints in fire-rated assemblies.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

1. U-Bead: Use at exposed panel edges.

2. L-Bead: Use at all exposed terminations of gypsum board, at all floor joints and joints to receive sealants.

3.3 CLEANING

A. Do not dispose of or leave excess gypsum board materials or debris on the premises. Leave each area broom clean after completing gypsum board work. Clean spots and spills of taping and finishing compounds from all adjacent surfaces and equipment.

END OF SECTION

CERAMIC TILING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of ceramic tile.

B. Related Sections:

1. Division 9 Section "Gypsum Board" for installation of ceramic tile backing board.

2. Division 9 Section "Finish Schedule."

1.2 REFERENCES

A. American National Standards Institute (ANSI), Specifications for the Installation of Ceramic Tile, A108.1,.4,.5,.6,.8,.9,.10; A118.1,.3,.4,.7,.8; A136.1; and A137.1.

B. American Society for Testing and Materials (ASTM) C206, Finishing Hydrated Lime.

C. Tile Council of North America, Inc. (TCNA) Handbook for Ceramic, Glass, and Stone Tile Installation, current edition.

1.3 DEFINITIONS

A. Ceramic Tile: A generic term inclusive of all tile materials that are set with mortar and joints grouted as defined by the Tile Council of North America, Inc. (TCNA) Handbook for Ceramic, Glass, and Stone Tile Installation, current edition.

1.4 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Tile and grout samples for review of color selection.

1.5 QUALITY ASSURANCE

A. All work performed by workers skilled in the installation of ceramic tile in accordance with TCNA recommendations, specifications and tile manufacturer's instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in manufacturer's unbroken packages and properly store to protect from contamination.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Ceramic Tile: Refer to Finish Material Legend.

B. Mortar, Grout, and Adhesive: Refer to Finish Material Legend.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 PERFORMANCE

A. Water-Cleanable Epoxy Adhesives and Grout: Shall be stainproof, chemical resistant 100% solids epoxy with high temperature resistance and shall meet the following minimum physical requirements in compliance with ANSI A118.3 test methods:

1. Compressive Strength: 4500 psi min.

2. Shear Bond Strength: 1000 psi min.

3. Water Absorption: 0.5% max.

4. Service Temperature: Up to 230°F.

5. The finished epoxy grout shall be chemically and stain resistant to ketchup, mustard, tea, coffee, milk, soda, beer, wine, bleach (5% solution), ammonia, juices, vegetable oil, detergent, brine, sugar, cosmetics, and blood. It shall also be chemically resistant to dilute acids and alkalis, gasoline, turpentine, and mineral spirits.

2.3 MATERIALS

A. Ceramic tile shall be Quality Certified by the TCNA, ANSI/TCNA A137.1, and as scheduled.

1. Base: Where wall tile occurs, base is integral with wall tile; at other wall finishes, base is 6-inches high with bullnose top edge. All base shall have a coved bottom edge.

2. Furnish all standard and accessory shapes and sizes as required to complete the work. Do all cutting of units with tile saw.

B. Epoxy Mortar: Laticrete “Latapoxy 300 Adhesive,” epoxy resin, hardener, and chemical resistant silica filler for walls and floors.

C. Epoxy Grout:

1. Laticrete “SpectraLOCK Pro Premium Grout” (Walls and Floors).

2. Color: Laticrete 24 Natural Grey.

Waterproof Membrane, Liquid-Applied: “Laticrete “HydroBan.”

D. Uncoupling Membrane: Laticrete “Strata_Mat,” fleece laminated polyethylene membrane with mortar hydration vents, for use with modified mortar.

E. Joint Tape: 2-inches wide coated fiberglass tape.

F. Joint Sealant:

1. Mildew resistant silicone sealant. Color as selected.

2. Products:

a. DAP "8640."

b. G.E. "Sanitary 1700."

G. Sealer: As recommended by tile manufacturer.

H. Edge Trim: Schluter Systems "Schluter-SCHIENE-E," stainless steel edge protection, height sized to fit tile.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and conditions on which material is to be installed. Notify Architect of any condition that would be detrimental to the proper installation, and verify all environmental requirements.

3.2 INSTALLATION

A. Floors:

1. Use TCNA F148-16, "Plywood Subfloor" thin-set installation procedure consisting of waterproof membrane, membrane bond coat, uncoupling membrane, epoxy mortar bond coat, and epoxy grouted ceramic tile for installation over wood frame structural floors where deflections do not exceed 1/360 of span.

2. Install uncoupling membrane in accordance with membrane manufacturer's printed instructions.

B. Walls:

1. Walls with Ceramic Tile Backing Board Substrate:

a. Coordinate with Division 9 Section "Gypsum Board" for application of ceramic tile backing board substrate.

b. Check for soundness of framing, adequate fastening, and fit of joints.

c. Cover all horizontal and vertical joints with fiberglass tape embedding in a skin coat of mortar.

d. Use TCNA W245-16 "Coated Glass Mat Water-Resistant Gypsum Backer Board" installation procedure consisting of epoxy mortar bond coat on ceramic tile backing board and epoxy grouted ceramic tile. Do not install vapor retarder behind backing board (see installation instructions of ceramic tile backing board manufacturer, GP DensShield.

e. Use TCNA W247-16 "Fiber-Reinforced Water-Resistant Gypsum Backer Board" installation procedure consisting of epoxy mortar bond coat on ceramic tile backing board and epoxy grouted ceramic tile. Do not install vapor retarder behind backing board (see installation instructions of ceramic tile backing board manufacturer, USG Fiberock.

f. Provide edge trim tile at all exposed tile edges.

C. Sealant: Install in joint between wall base and floor tile.

D. Sealer: Apply sealer before and after grouting on tiles that the manufacturer recommends sealer application.

3.3 CLEANING

A. Sponge and wash tile diagonally across joints when setting and grouting is complete. Do not use acid or acid cleaner on glazed tile. Acid clean unglazed tile not less than ten days after setting, wet tile before applying acid wash, carefully follow manufacturer's instructions, protect all adjacent surfaces, and thoroughly flush with water when completed. Finally, polish with clean dry cloths.

3.4 SCHEDULE

A. Refer to Finish Material Legend.

END OF SECTION

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services necessary for the installation of acoustical ceilings, complete with suspension systems.

B. Related Sections:

1. Division 1 Section “Design-build Requirements” for suspended acoustical ceilings.

1.2 REFERENCES

A. Acoustical and Insulating Materials Association Bulletin.

B. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Samples of exposed tee grid and acoustical board for review of color.

C. Shop drawings showing coordination of suspension grid layout with room dimensions and penetrations of ceiling mounted equipment. Include layout of systems utilizing acoustic isolation components.

D. Suspension System Design Data: Copies of Engineered Design calculations, drawings and documentation prepared by a structural engineer registered in the State of Oregon, showing compliance and classification of light, intermediate, or heavy duty system. Include manufacturer’s literature or ICC Reports and identification of connection devices and approved loading capabilities.

E. Manufacturer’s Suspension System Data: When using a standard 24-inch x 24-inch or 24-inch x 48-inch grid system in lieu of an Engineered Design, submit copies of manufacturer’s literature or ICC Report indicating light, intermediate, or heavy duty system. Include fixture schedule and other ceiling supported equipment and their weight, with connection devices and approved loading capabilities.

1.4 QUALITY ASSURANCE

A. Installer’s Qualifications: All work performed by skilled acoustical mechanics in the best and most professional manner. Material installed to provide a proper and symmetrical pattern in each area with joints straight and true and all corners level.

B. Regulatory Agency Requirements: All ratings in conformance with the Acoustical and Insulating Materials Association Bulletin.

C. Seismic Requirements:

2. Suspended acoustical ceiling systems, with or without lighting fixtures, air terminals, or other ceiling mounted items shall comply with the requirements of ASTM C635, ASTM C636, and the building code.

3. Ceiling areas of 144 s.f. or less surrounded by walls which connect directly to the structure above shall be exempt from these standards.

4. Light Duty systems to be used only where no loads other than ceiling acoustical materials weighing not more than 1.5 lbs./s.f. are supported by the suspension system.

5. Intermediate and Heavy Duty classification systems shall be used where suspension system is used to support acoustical material weighing more than 1.5 lbs./s.f., lighting fixtures or other equipment.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Properly store material within the building in such a manner and sufficiently in advance of installation to ensure adjustment to building temperatures and humidities.

1.6 PROJECT CONDITIONS

A. Do not begin installation until residual moisture from concrete, plaster and other wet application material is dissipated, building enclosed with permanent heating/cooling equipment in operation.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate with Divisions 23 and 26 for installation of heating and lighting components integrated in the ceiling installation.

1.8 WARRANTY

A. Provide manufacturer’s standard warranty, one year minimum. This Warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.

1.9 MAINTENANCE

A. Extra Materials: Furnish to the Owner in factory-sealed containers a 2% overrun of acoustical board from the same production run as that used in this installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustical Board: Armstrong, USG, Celotex.

B. Exposed Tee Grid: Armstrong.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. ACT-1, Acoustical Board:

1. Mineral fiber, beveled tegular edge, 24-inches x 48-inches x 3/4-inch thick, IBC Class A flame-spread index per ASTM E84, LR 0.85, NRC 0.65, CAC 35 minimum.

2. Product: Armstrong "Cirrus Second Look II," 510, color white.

B. Suspension Systems:

1. Exposed Tee: Main and cross tees, 1-1/2-inches deep, 9/16-inch wide, exposed surfaces finished with flat white baked enamel, color to match acoustical board. Matching wall angles and Armstrong BERC 2 seismic clips.

a. Product: Armstrong “Suprafine XL Seismic Rx.”

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge

PART 3 EXECUTION

3.1 INSTALLATION

A. Suspension Systems:

1. System to be supported on minimum 12 gauge galvanized hanger wire at 4-feet o.c. Suspension wires spaced at greater than 4-feet shall be 10 gauge.

2. Approved type attachment devices capable of supporting five times the ceiling load and not less than 100 lbs. Powder driven devices not permitted. Vertical wires attached with a minimum of three turns and not hang more than 1-in-6 out-of-plumb unless countersloping hangers are provided.

3. Carrying channels and main runners to be level within 1/8-inch in 12-feet with hangers taut. Bending or kinking of hangers not permitted. Deflection limited to 1/360 (1/8-inch) in 4-feet. Fixture loads causing excess deflection shall be independently supported or the grid supplementally supported within 6-inches of each corner, and such loads shall not cause rotation of runners more than 2 degrees from vertical. Provide trapeze type system where obstructions preclude direct attachment. All runners shall be supported within 8-inches of wall or discontinuity.

4. Lateral bracing required in lieu of Engineered Design installed within 4-feet of walls and at 12-feet o.c. in each direction. Install four 12 gauge wires within 2-inches of a main runner intersection with a cross runner and splayed at 90 degrees from each other and at an angle not exceeding 45 degrees of the ceiling plane.

5. Adjacent and parallel to the wall, secure a stabilizer bar to the members perpendicular to the wall to prevent spreading. The wall closure member may be used at two adjacent walls with clearances maintained at the other two walls.

6. Seismic Clips: Install in compliance with ASTM C636, CISCA, and standard industry practices.

7. Light Fixture Support:

    a. Positively attach all lighting fixtures to the suspended ceiling system. The attachment device shall have a capacity of 100% of the lighting fixture weight acting in any direction.

    b. When intermediate systems are used, 12 gauge hangers shall be attached to the grid members within 3-inches of each corner of each fixture. Tandem fixtures may utilize common wires.

    c. Where heavy-duty systems are used, supplemental hangers are not required if a 48-inch modular hanger pattern is followed. When cross runners are used without supplemental hangers to support lighting fixtures, these cross runners must provide the same carrying capacity as the main runner.

    d. Lighting fixtures weighing less than 56 lbs. shall have, in addition to the requirements outlined above, two 12-gauge hangers connected from the fixture housing to the structure above. These wires may be slack. Lighting fixtures weighing 56 lbs. or more shall be supported directly from the structure above by approved hangers.

    e. Pendant-hung lighting fixtures shall be supported directly from the structure above using 9 gauge wire or approved alternate support without using the ceiling suspension system for direct support.

8. Air Terminal Support:

    a. Ceiling mounted air terminals or services weighing less than 20 lbs. shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.

    b. Terminals or services weighing 20 lbs. but not more than 56 lbs., in addition to the above, shall have two 12-gauge hangers connected from the terminal or service to the ceiling system hangers or to the structure above. These wires may be slack.

    c. Terminals or services weighing more than 56 lbs. shall be supported directly from the structure above by approved hangers.

B. Exposed Tee Suspension System: Where suspended acoustic tee bar ceilings are called for on the Drawings, the suspension system shall be an exposed T grid. Standard hangers placed 48-inches o.c. in both directions. Exposed metal parts finished with white baked enamel. Suspension system hung in a true plane with a grid pattern of 2-feet x 4-feet unless otherwise noted.

C. Beveled tegular edge boards that are cut to fit less than full size ceiling grid modules shall have a matching beveled tegular edge routed into the cut edge. Paint the routed beveled tegular edge with paint type and color to match the factory finish.

3.2 COMPLETION

A. Adjusting Defective Work: Adjust grid height as required to maintain ceiling system leveled to within 1/8-inch in 12-feet. Remove and replace panels and tiles which are improperly placed, broken, or damaged. Adjust perimeter molding where gaps between molding and vertical surface exceeds 1/8-inch. Adjust suspension system grid to form flush hairline joints.

3.3 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

LINEAR WOOD CEILING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of linear wood panel systems including:

1. Concealed suspension system for wood grille ceiling panels.
2. Wood grille ceiling panels.
3. Trim and accessories.
4. Seismic restraints for suspended ceiling system.
5. **Acoustical insulation.**

B. Related Section: Division 9 Section “Wood Panel Ceilings.”

1.2 REFERENCES

A. ASTM A 641: Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire; 1992.

B. ASTM C 423: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 1990.

C. ASTMC C 635: Standard Specifications for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

D. ASTM C 636: Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1992.

E. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials; 1991.

F. ASTM E 580: Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 1991.

G. Architectural Woodwork Quality Standards (AWS): Architectural Woodwork Standards, Guide Specifications and Quality Certification Program, Edition 1, adopted and published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada and The Woodwork Institute.

H. CISCA: Ceiling Systems Handbook.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product Data: For each type of product specified.

C. Samples: For verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the range of variations expected.

1. 12” x 18” samples of each panel type, pattern, and color.

D. Shop Drawings: Provide Shop Drawings/Coordination Drawings for all ceilings, which should include RCP and product details. Coordinate Wood Grille ceiling panels layout and installation of wood panels and suspension system components with other construction elements that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire- suppression system components, partition assemblies and all perimeter conditions.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer, approved by wood panel manufacturer, who has completed ceiling and wall panels similar in species, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Inspection: All work must pass inspection and approval of architect, as well as the local codes and regulations or authorities having jurisdiction.

C. Single-Source Responsibility for Wood Panel Systems: Obtain all types of wood panels from a single fabricator, with in-house Shop Drawing capabilities, in-house assembly and finishing capabilities, and with resources to provide products of consistent quality in appearance and physical properties without delaying the project.

D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying project.

E. Fire Performance Characteristics: Fire resistant wood ceiling strips shall meet Class A Fire Spread index and Class A Smoke Developed index per ASTM E84.

F. Seismic Requirements:

1. The suspended ceiling system for this building must be engineered for the appropriate forces due to the buildings classification as an Occupancy Category 3 or 4 (OSSC, table 1604.5). Provide structural calculations and details for the vertical and, if applicable, the lateral forces. Refer to State of Oregon Interpretation No: 2010 OSSC Section 1613.1 which may be found at http://www.cbs.state.or.us/bcd/programs/structural_interps.html.

2. Suspended wood panel ceiling systems, with or without lighting fixtures, air terminals, or other ceiling mounted items shall comply with the requirements of ASTM C635, ASTM C636, and the building code.

3. Ceiling areas of 144 s.f. or less surrounded by walls which connect directly to the structure above shall be exempt from these standards.

4. Light Duty systems to be used only where no loads other than ceiling acoustical materials weighing not more than 1.5 lbs./s.f. are supported by the suspension system.

5. Intermediate and Heavy Duty classification systems shall be used where suspension system is used to support acoustical material weighing more than 1.5 lbs./s.f., lighting fixtures or other equipment.

G. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Unloading: Coordinate crate sizes, weights, unloading options, and delivery schedule with manufacturer prior to fabrication. Deliver wood panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other mistreatment.

B. Acclimatization: Before installing wood panels, permit them to reach room temperature and a stabilized moisture content (at least 72 hours) per AWI standards.

C. Handling: Handle Wood panels carefully to avoid chipping edges or damaging units.

1.6 PROJECT CONDITIONS

A. Install only when temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. Heating and cooling systems shall be operating before, during, and after installation.

B. Prior to start of installation, ensure that all exterior windows and doors are in place, glazed, and weatherstripped, and that all wet trades' work is completed and thoroughly dry.

C. Ensure that mechanical, electrical, and other utility service installations above the ceiling plane are complete. No materials may rest against or wrap around the ceiling suspension components or connecting hangers.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate layout and installation of the linear ceiling and its suspension system with other work penetrating the ceiling including light fixtures, HVAC equipment, and fire suppression system components.

1.8 WARRANTIES

A. Warranties: Provide owner with a (1) year warranty for material and workmanship on all installed products.

1. Manufacturers: All materials, wood panels and grid, shall be warranted for (1) one year for material and workmanship.

2. Installer: All work shall be warranted for (1) year from final acceptance of completed work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: 9Wood, Inc. (www.9wood.com).

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 LINEAR WOOD PANELS

A. WCP-3, Acoustical Ceiling Panel: 9Wood, Inc. Wood Grille, Series 1100 Panelized Linear:

1. Style: 1100 Cross Piece Grille, SKU 1124-5

2. Species: Hardrock white maple.

3. Member Size: 1” x 3-1/4.”

4. Edge Profile: Square.

5. Members/LF: 5 members per LF.

6. Assembly Style: Cross Piece Backer.

7. Panel Sizes: 1’ x 8’ (Nom).”

8. Termination at Walls: Floating open reveal.

9. Fire Rating: Class 1(A) Fire Rating.

10. Finish: Clear pre-catalyzed lacquer, MATTE finish on stained wood to match Architect’s sample.

B. Reveal Scrim: Black reveal scrim.

C. Acoustical Insulation: 2-inch thick black fiberglass backing with NRC 0.85 min.

1. Manufacturers:

a. "SelectSound Black" by Owens-Corning.

b. "IS-300 Black Insul-Shield" by Johns Manville.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal T-Grid Suspension System: Provide standard interior Metal Heavy Duty 15/16” suspension T-Grid system using Main Runners, Cross-tees, Wall Angle or Shadow Moldings of types, structural classifications, and black finishes indicated and that comply with applicable ASTM C 635 requirements. Comply with all applicable codes and ordinances.

B. Attachment Devices: Size for 3 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated. Attach with removable acorn nut and twist clips to allow removal of panels for access above ceiling where required.

C. Wire, Braces, Ties, Hanger Rods, Flat Hangers and Angle Hangers: Provide wires, rods and hangers that comply with applicable ASTM specifications.

2.4 ACCESSORIES

A. Fasteners: As recommended and supplied by panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. General: Examine substrates and structural framing to which ceiling panels attach or abut, with installer present, for compliance with requirements specified in this and other sections that affect ceiling panel installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.

B. Layout: Conform to the layout shown on reflected ceiling plans in accordance with wood panel manufacturer’s reviewed Shop Drawings.

3.3 INSTALLATION

A. General:

1. Ceiling Panels: Install wood ceiling panels to comply with manufacturer's instructions and CISCA "Ceiling Systems Handbook."

B. Protection: Protect completed work above suspension system from damage during installation of suspension system components.

C. Attachments: Suspend ceiling hangers from building's structural members per manufacturer’s instructions and in compliance with all local codes and regulations.

D. Suspension Runners: Install suspension system runners so they are square and securely interlocked with one another. Install number and use on-center spacing per wood ceiling manufacturer’s instructions, as indicated on approved Shop Drawings and in compliance with all local codes.

E. Installation of Metal T-Bar Grid: Install, align, brace, tie-off, mount, handle interferences, and space suspension T-Grid in accordance with suspension manufacturer’s instructions and in compliance with all local codes and regulations.

F. Installation of Wood Panels:

1. Install wood ceiling panels in accordance with manufacturer’s installation instructions and in compliance with all local codes and regulations. Install with undamaged edges and fitted accurately to suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit, as required. Attach panels with with removable acorn nut and twist clips to allow removal of panels for access above ceiling where required.

3.4 CLEANING

A. General: Clean exposed wood surfaces of wood panels. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace wood components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

WOOD PANEL CEILINGS AND WALLS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services required for the fabrication and installation of wood panel ceilings.

B. Related Section: Division 9 Section “Linear Wood Ceilings.”

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Product specifications and installation instructions for all supplied ceiling materials.

C. Shop drawings showing placement of suspension system and other details deemed pertinent to proper installation.

D. Wood sample, one plank wide x 12-inches long, of the wood species specified, with the selected finish applied.

E. Design Data: Copies of Engineered Design calculations, drawings and documentation prepared by a structural engineer registered in the State of Oregon showing compliance and classification of light, medium or heavy duty suspension system. Include manufacturer's literature or ICC Reports and identification of connection devices and approved loading capabilities.

F. Manufacturer's Data: When using a manufacturer's standard grid system in lieu of an Engineered Design, submit copies of manufacturer's literature or ICC Report indicating light, medium or heavy duty suspension system. Include fixture schedule and other ceiling supported equipment and their weight, with connection devices and approved loading capabilities.

G. Warranty, as described below.

1.4 QUALITY ASSURANCE

A. Installer's Qualifications: The installer must be a firm with a minimum of two years' successful experience in installation of suspended wood ceilings of similar requirements to this project.

B. Fire Performance Characteristics: Fire resistant wood ceiling strips shall meet Class A Fire Spread index and Class A Smoke Developed index per ASTM E84.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to project site in original, labeled, unopened packages.

B. Store materials flat and level in a fully enclosed space. For a minimum of 72 hours immediately prior to ceiling installation, store linear wood strips in the room in which they will be installed. The temperature and humidity of the room shall closely approximate those conditions that will exist when the building is occupied. Store wood panels off the floor. Exercise care in handling to avoid damage.

1.6 WARRANTY

A. Manufacturer: Warranty all materials supplied by ceiling manufacturer against manufacturing defects for one year. Because of differing site conditions, wood stains and colorings can vary with age and are excluded from this warranty.

B. Contractor: Warranty all work for one year after Substantial Completion.

1.7 PROJECT CONDITIONS

A. Install only when temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. Heating and cooling systems shall be operating before, during, and after installation.

B. Prior to start of installation, ensure that all exterior windows and doors are in place, glazed, and weatherstripped, and that all wet trades' work is completed and thoroughly dry.

C. Ensure that mechanical, electrical, and other utility service installations above the ceiling plane are complete. No materials may rest against or wrap around the ceiling suspension components or connecting hangers.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate layout and installation of the linear ceiling and its suspension system with other work penetrating the ceiling including light fixtures, HVAC equipment, and fire suppression system components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product Manufacturers: 9-Wood, 888/767-9990.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. WCP-1, Wood Ceiling Panels: 9-Wood Series 4300, sku 4324-48.

1. Tile Size: 24” x 48.”

2. Veneer: Grade AA veneer of clear vertical grain hardrock white maple.

3. Panel Core: 3/4-inch medium density fiberboard.

4. Reveal: 3/8” panel reveal.

5. Assembly Style: Aluminum cleats, lift and lock accessability.

6. Fire Rating: ASTM E84, Class 1.

7. Finish: Clear pre-catalyzed lacquer, satin on stained wood to match Architect’s sample.

B. WCP-2, Wood Ceiling Panels: 9-Wood Series 5400, wood veneer ceiling tiles, sku 5495-08.

1. Tile Size: 24” x 48.”

2. Veneer: Grade AA veneer of clear vertical grain hardrock white maple.

3. Panel Core: 3/4-inch medium density fiberboard.

4. Reveal: 3/8” panel reveal.

5. Perforation Pattern: As selected by Architect.

6. Assembly Style: Aluminum cleats with lift and lock accessibility.

7. Fire Rating: ASTM E84, Class 1.

8. Finish: Clear pre-catalyzed lacquer, satin on stained wood to match Architect’s sample.

C. WWP-2, Wood Wall Panels: 9-Wood Series 4500, wood veneer wall tiles, sku 4524-48.

1. Tile Size: 24” x 48.”

2. Veneer: Grade AA veneer of clear vertical grain hardrock white maple.

3. Panel Core: 3/4-inch medium density fiberboard.

4. Reveal: 3/8” panel reveal.

5. Assembly Style: As detailed for wall mounting.

6. Fire Rating: ASTM E84, Class 1.

7. Finish: Clear pre-catalyzed lacquer, satin on stained wood to match Architect’s sample.

D. **Acoustical Backer: Sound Tex black acoustical scrim.**

E. **Acoustical Insulation: 1-1/2-inch thick black fiberglass backing.**

F. **Acoustical Insulation:**

1. **Mineral fiber unfaced blankets, 24-inches x 48-inches x 3-inches thick, 2.5 lb./cu.ft. density, 85 percent post-industrial recycle content.**

2. **Product: Thermafiber, Inc. "Thermafiber SAFB."**

G. Suspension Systems:

1. Metal T-Grid Suspension System: Provide standard interior Metal Heavy Duty 15/16” suspension T-Grid system using main runners, cross-tees, and wall angle of types, structural classifications, and black finishes indicated and that comply with applicable ASTM C 635 requirements. Comply with all applicable codes and ordinances.

2. Attachment Devices: Size for 3 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

3. Wire, Braces, Ties, Hanger Rods, Flat Hangers and Angle Hangers: Provide wires, rods and hangers that comply with applicable ASTM specifications.

H. Edges, Borders, and Perimeter Trims Exposed to View:

1. Premium Grade clear hardrock white maple.

2. Finish: Factory-finished with three coats clear satin finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. General: Examine substrates and structural framing to which ceilings attach or abut, with installer present, for compliance with requirements specified in this and other sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Layout: Measure each ceiling area and establish the layout of Acoustic Wood members to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans in accordance with wood ceiling manufacturer’s approved Shop Drawings.

3.3 INSTALLATION

A. General: Install acoustical wood panels to comply with manufacturer's instructions and CISCA "Ceiling Systems Handbook."

B. Attachments: Suspend ceiling hangers from building's structural members per manufacturer’s instructions and in compliance with all local codes and regulations.

C. Installation of Metal T-Bar Grid: Install, align, brace, tie-off, mount, handle interferences, and space suspension T-Grid in accordance with suspension manufacturer's instructions and in compliance with all local codes and regulations.

D. Suspension Runners: Install suspension system runners so they are square and securely interlocked with one another. Install number and use on-center spacing per wood ceiling manufacturer's instructions, as indicated on reviewed Shop Drawings and in compliance with all local codes.

E. Installation of Acoustical Panels: Install acoustical wood panel ceiling members in accordance with manufacturer's installation instructions. Install with undamaged edges and fitted accurately to suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit, as required.

F. Acoustical Insulation: Place insulation above suspended ceiling as detailed, edges tightly butted, and no product labeling or other colors visible except all black surfaces.

3.4 FIELD QUALITY CONTROL FOR ATTACHMENT TO CONCRETE CEILINGS

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Tests and Inspections: Testing and inspecting of completed installations of suspension system ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of suspension system hangers for the next area until test results for previously completed installations of hangers show compliance with requirements.

C. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.

1. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbs of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbs of tension.

2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

3. Remove and replace suspension system hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.5 CLEANING

A. General: Clean exposed wood surfaces. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace wood ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

RESILIENT FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services required to install resilient floor covering and base. Prepare floors to receive new material.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Sample of each color and pattern of resilient flooring and welding rods. Do not start work until samples of material have been approved.

1.4 QUALITY ASSURANCE

A. Conform to resilient flooring manufacturer's installation instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver finish materials to job site only when satisfactory conditions for storage can be provided. Maintain in manufacturer's unbroken packages with original labels thereon.

1.6 PROJECT CONDITIONS

A. Do not begin installation until the work of all other trades including painting has been completed and the temperature of the rooms maintained at 70°F at least 48 hours before work proceeds.

B. The Owner will employ the services of an Independent Testing Laboratory (ITL) for testing the moisture content of concrete slabs. Cooperate with the Testing Laboratory by providing the required environmental conditions for moisture testing.

1.7 WARRANTY

A. Provide manufacturer's standard warranty for each resilient flooring type.

1.8 MAINTENANCE

A. Extra Materials: Furnish to Owner two boxes of same run of each pattern and color of tile.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. RF-1, Linoleum:

1. Manufacturer/Pattern: Forbo "Marmoleum" linoleum.

2. Size: 79-inches wide, 0.10-inch thick.

3. Backing: Jute.

4. Surface Protection: Forbo “Topshield2.”

5. Fire Resistance:

a. Smoke Density: ASTM E662/NFPA 258, 450 or less.

b. Critical Radiant Flux: ASTM E648/NFPA 253, Class 1.

6. Style and Color: Refer to Finish and Materials Legend.

B. RB-1, Rubber Base:

1. ASTM F1861 Type TS, Group 1, thermoset vulcanized SBR rubber, continuous roll, 1/8-inch gauge, 6-inch top-set, coved toe at hard floor finishes, straight base at carpet.

2. Manufacturers: Flexco, Roppe, Burke/Mercer, Johnsonite, and Nora.

3. Color: Refer to Finish and Material Legend.

C. TS-1, Rubber Transition Strip:

1. Manufacturer: Johnsonite “Rubber Reducer Strip 158.”

2. Size: 3/8-inch carpet edge reducer to resilient flooring.

3. Color: Refer to Finish Material Legend.

D. Adhesives: Refer to product manufacturer's recommendations for appropriate low VOC adhesive. Use only adhesives approved by resilient flooring manufacturer.

E. Mastic Underlayment and Patching Compound:

1. Latex underlayment.

2. Manufacturer: Armstrong "S-760."

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, with installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F710 except for:

1. Moisture testing paid for by the Owner:

2. Removal of curing compounds and hardeners used to reduce moisture emission;

3. Repair of concrete floors performed by Division 3 Section “Cast-in-place Concrete.”

3.3 INSTALLATION

A. Linoleum: Install using manufacturer's written installation system. Applicators shall be experienced in this type of installation. Pre-plan installation for least seams. All seams heat welded.

B. Rubber Reducing Strip: Install edge reducing strip at all exposed edges of resilient flooring in doorways or borders of resilient flooring and other floor finish, except not required where carpet binder bar is provided, or at metal thresholds.

C. Base:

1. Install top-set base on floor covering with corners neatly fitted.

2. Install straight base at carpets and coved base at hard floor finishes.

3. Inside corners mitered and outside corners formed from continuous roll extending at least 12-inches beyond corner and installed with contact cement.

4. Install base on cabinets where scheduled.

5. Where wall finish opening at floor is over 1/4-inch, do not install base until gap in substrate has been reduced to 1/4-inch or less with appropriate filler material.

6. Cut coved toe back at 45 degree angle at door frame terminations.

3.4 CLEANING AND SEALING

A. When floors have sufficiently seated themselves to permit cleaning and other trades have completed their work, sweep and damp mop the floors. Do not wash or machine scrub the floor for at least 5 days after installation.

B. Linoleum:

1. Remove all surface soil by sweeping or dust mopping.

2. Scrub with rotary or automatic scrubber and scrubber pad using neutral pH (7/8.5) detergent. Do not strip the factory finish. Do not saturate the floor, use as little water as possible, rinse with clean water and allow the floor to dry.

C. Demonstration: Provide instruction for Owner's maintenance personnel on proper procedures of maintaining linoleum flooring.

END OF SECTION

CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of carpet.

1.2 REFERENCES

A. American Association for Textile Chemists and Colorists (AATCC).

B. American Society for Testing and Materials (ASTM).

C. Carpet and Rug Institute (CRI).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Shop drawings showing the layout for each area to receive carpet. Show carpet color, trim strips, and any pertinent installation details. Do not install carpet prior to layout approval.

C. Product Data: Data on specified products describing physical and performance characteristics, patterns and colors available, and methods of installation.

D. Written certification from carpet manufacturer to the Owner stating that the register numbered carpet furnished was manufactured in accordance with these Specifications.

E. Samples:

1. Full size tile of each carpet.

2. Furnish samples of carpet to the job when and as directed by Architect for testing by an independent testing laboratory. Costs for all testing will be paid in accordance with Division 1 Section “Quality Control.”

F. Carpet manufacturer's maintenance and cleaning procedures for maximum life and appearance of carpet. This includes but is not limited to commercial cleaning, spot cleaning and vacuum cleaning for each carpet selected.

G. Warranty, as described below.

H. Certification and description of reclamation and recycling process.

I. Carpet manufacturer certification of compliance with the Carpet and Rug Institute Green Label Indoor Air Quality Test Program.

1.4 QUALITY ASSURANCE

A. Indoor Air Quality: Carpet shall meet or exceed the minimum standards contained in the Carpet and Rug Institute (CRI) consumer information label.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver all carpet to the job site in original mill wrappings, each package having register number tags attached or register number marked on packaging. Do not deliver material to job site until notification and arrangements are made to properly handle, store, and protect materials. Store under cover in well ventilated spaces as soon as delivered; protect from damage, dirt, stains, and moisture during transit and storage.

1.6 PROJECT CONDITIONS

A. Do not begin installation until the work of all other trades including painting has been completed and the temperature of the rooms maintained at 70 degrees F at least 48 hours before work proceeds.

1.7 SEQUENCING AND SCHEDULING

A. Make provisions for and do all necessary work to receive or adjoin other work, install carpet accessories, and provide holes and openings necessary to fit work of other trades.

1.8 WARRANTY

A. Contractor's Warranty: Written one year warranty starting at Substantial Completion and covering all repair or replacement due to defective materials or their installation. Any manufacturer's regular guarantee shall remain in effect for its full duration in addition to Contractor's guarantee.

B. Manufacturer's Warranty:

1. Ten year warranty against 10% loss of face fiber.

2. Ten year warranty against edge ravelling, snags, picks, runs, and delamination.

3. Five year warranty against permanent staining.

4. Five year warranty against fading (at not less than gray scale rating of 4).

5. Carpet warranted not to generate more than 3.5 KV at 70°F and 20% R.H. for life of carpet.

6. Antimicrobial effectiveness warranted for life of carpet.

1.9 MAINTENANCE

A. Extra Materials: Furnish scheduled overrun for future repairs and replacement, wrapped, packaged and labeled at the factory. Same dye lot and run as carpet installed. Save and package usable remnants; label and deliver to Owner.

B. Retain and identify trim pieces of usable size. Package and store same as specified for Overrun, below.

C. Overrun Schedule (each color):

Installed	Overrun
0 - 50 sq.yds.	10%
51 - 250 sq.yds.	5%
251+ sq.yds.	3%

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section “Product Requirements.”

2.2 MATERIALS

A. All materials new and of domestic manufacture. Carpet of first quality and from the same dye lot for each color to be installed. Materials, construction, and appearance are based on the following performance specifications.

B. CPT, Carpet: Refer to Finish Material Legend.

C. WM-1, Walk-Off Mat: Refer to Finish Material Legend.

D. Accessories:

1. Edging for Glue-Down Carpet and Walk-Off Mat: Metal or vinyl edging of standard color to complement carpet color as selected by Architect.

2. Adhesives: Solvent-free adhesives and seam sealants with low VOC emissions as recommended by carpet manufacturer. Zero-VOC if available, maximum VOC level not to exceed 50 g/l.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, with installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of carpet products.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of carpet products.

B. Do not install carpet until all other trades have completed their work in the area to be carpeted.

C. Inspect carpet before laying for streaking, shading, spots, soil, tears, pull tufts, or other defects. Remove defective carpet from premises and replace with undamaged carpet.

D. Acclimate carpet a minimum of 24 hours prior to installation.

3.3 INSTALLATION

A. Carpet Tile:

1. Blend carpet tiles from different cartons to ensure minimal variation in color match. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

2. Locate change of color or pattern between rooms under door centerline.

3. Fully adhere carpet tile to substrate.

4. Trim carpet tile neatly at walls and around interruptions.

B. Walk-Off Mat:

1. Install walk-off matt in accordance with manufacturer's recommendations for seaming technique and proper amount of stretch in width and lengths.

2. Seams: Cement all seams of walk-off mat. Use continuous lengths and as broad widths as possible to minimize the placement of seams in traffic lanes. Locate seams as indicated on shop drawings. Cut edges true, properly treated, and cemented to form invisible non-raveling seams.

3. Double cut seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to all cut edges immediately.

4. Glue-Down: Conform to manufacturer's direct glue-down installation instructions and recommended materials for adhesive installation using only recommended adhesives and primers.

3.4 CLEANING

A. Remove debris after installation and clean carpet of all spots with manufacturer approved spot remover. Remove all threads with sharp scissors and thoroughly vacuum clean. Installed carpet shall be free of spots and dirt, and be without tears, fraying, or pulled tufts.

3.5 DEMONSTRATION

A. Instruct Owner in proper care and maintenance of the carpet.

3.6 PROTECTION

A. Protection of carpet after completion of installation is specified as general work and is made a part of the work of all trades doing work in areas after carpet installation.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet is without damage or deterioration at the time of Substantial Completion.

END OF SECTION

TACKABLE WALL COVERINGS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services required for the application of tackable wall coverings as detailed.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Manufacturer’s product data for wall covering, adhesive, and trim.

C. Product samples for wall covering (6-inches x 6-inches) and trim 6-inches long.

1.4 WARRANTY

A. Provide warranty against manufacturing defects for 5 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Tackable Wall Coverings: Forbo Flooring Systems, 800-842-7839.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Wall Primer: As recommended by wall covering manufacturer for each substrate type.

B. TB-1, Tackable Wall Covering: Forbo “Bulletin Board” uni-colored linoleum, 1/4-inch thick x 72-inches wide, ASTM E84 Class B, color 2182.

C. Exposed Edge Trim: Schluter-Schiene "AE60" clear satin anodized extruded aluminum trim, 1/4-inch high exposed edge with 1-inch wide mounting flange.

D. Adhesive: Low VOC as recommended by tackable wall covering manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Wall covering shall be applied by skilled workers in strict accordance with manufacturer's recommendations. Beginning work denotes acceptance of substrate.

B. Install edge trim an all edges not abutting other materials and where detailed.

C. Install all wall covering with texture in the same direction.

D. Apply adhesive as recommended, and adhere covering at the seam and work across the wall, roll down and outward, with good bond and without wrinkles or air pockets.

E. Remove excess adhesive with recommended solvent immediately after application, while adhesive is still pliable.

F. Install edges tight for firm and even butt joint.

3.2 CLEANING

A. Carefully clean all surfaces after application using recommended methods. Any stains or defects apparent after cleaning will require replacement of material.

3.3 CORRECTION OF DEFECTIVE WORK

A. Provide a finished installation with surfaces free of substrate imperfections telegraphing through to finish surface. Any telegraphing imperfections require removal of wall covering, repair of the substrate, and installation of new wall covering.

END OF SECTION

ACOUSTICAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services necessary for the installation of rigid fiberglass acoustical wall panels.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Ceiling and Interior Systems Contractors Association (CISCA) Use and Practice Manual.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings.

C. Manufacturer's data sheets.

D. Samples for color and texture selection.

E. Warranty, as described below.

1.4 QUALITY ASSURANCE

A. Field Samples: Install three panels of each acoustical panel system. Acceptable field samples will be used as a standard of comparison for Work on this Project. Acceptable field samples may be incorporated into the Project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in manufacturer's original packaging, store off the ground, protect from weather and traffic damage. Properly store material within the building in such a manner and sufficiently in advance of installation to ensure adjustment to building temperatures and humidities.

1.6 SITE CONDITIONS

A. Environmental Requirements, Temperature and Moisture: Maintain areas to receive acoustical panel systems at a minimum of 60 degrees F for 72 hours before, during, and for 72 hours after installation. Maintain areas to receive acoustical panel systems at 25% to 55% relative humidity 24 hours before, during, and 24 hours after installation.

B. Acclimate panels at occupancy environmental conditions for three days prior to installation.

1.7 WARRANTY

A. Provide a one year warranty against defects in material and fabrication.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Panel Fabricators:

1. Sound Concepts.
2. Conwed.
3. GTS Interior Supply, Inc.
4. Jasco Acoustical Wall and Ceiling Products.
5. Lamvin.
6. Wall Technology.
7. Sabin Sound Products.
8. Decoustics.
9. Kinetics Noise Control.
10. Real Acoustix.

B. Panel Fabrics: Refer to Finish and Material Legend.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. All materials ASTM E84, Class 1.

B. FWP-1 and FWP-2, Fabric Wrapped Acoustical Panels: Sound Concepts “HIR-1,” fabric wrapped acoustical wall panels.

1. Nominally 1-inch thick, 7 lbs./c.f. density, 1-inch thick rigid white fiberglass board with resin hardened edges and wrapped with 100% woven polyester. NRC 0.85 per ASTM C423.
2. Fabric Manufacturer: Refer to Finish and Material Legend.

C. Wall Clips: Manufacturer's standard French cleat wall clips.

PART 3 EXECUTION

3.1 PREPARATION

A. All Work shall be performed by skilled installers in the best and most professional manner. Material installed to provide a proper symmetrical pattern in each area with joints straight and true.

B. Do not begin application until residual moisture from concrete, plaster, and other wet application material is dissipated, building enclosed with permanent heating/cooling equipment in operation.

C. Examine areas scheduled to receive acoustical materials to ensure protection against weather and other hazards, inspect space allocated for proper depth to receive specified material. Coordinate timing of installation with carpenters, electricians, plumbers, and others whose Work may be affected or which may affect this Work.

3.2 INSTALLATION

A. Plan installation for panel sizes and joints as detailed.

B. Install flat wall panels over the gypsum surfaces as detailed. All installation by factory-authorized personnel and in accordance with the manufacturer's instructions.

END OF SECTION

PAINTING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services necessary for and incidental to painting work. Paint all surfaces in finished room areas as scheduled and those which normally require a paint finish for proper appearance and best serviceability such as wood, gypsum board, metal work, exposed conduit, pipes and ducts, and grilles, unless excepted.

B. Related Documents:

1. "Door Schedule" for door color and paint system.

2. "Finish Schedule" for room color and paint system.

3. Divisions 21 through 23 for painting of mechanical items such as piping, equipment, ductwork, etc., as required by those Divisions.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Architectural Woodwork Institute (AWI).

C. Master Painters Institute (MPI).

D. The Society for Protective Coatings (SSPC).

E. Painting and Decorating Contractors of America (PDCA).

1.3 DEFINITIONS

A. Regardless of the specular gloss name paint manufacturers give their products, provide specular gloss as measured on a 60° and 85° geometry Parallel-Beam Glossmeter per ASTM D523 and as defined by Master Painters Institute as follows:

1. Gloss Level 1: Traditional matte finish; flat. Gloss at 60°: Maximum 5 units. Sheen at 85°: Maximum 10 units.

2. Gloss Level 2: High side sheen flat; velvet-like finish. Gloss at 60°: Maximum 10 units. Sheen at 85°: 10 to 35 units.

3. Gloss Level 3: Traditional eggshell-like finish. Gloss at 60°: 10 to 25 units. Sheen at 85°: 10 to 35 units.

4. Gloss Level 4: Satin-like finish. Gloss at 60°: 20 to 35 units. Sheen at 85°: Minimum 35 units.

5. Gloss Level 5: Traditional semi-gloss. Gloss at 60°: 35 to 70 units.

6. Gloss Level 6: Traditional gloss. Gloss at 60°: 70 to 85 units.

7. Gloss Level 7: High gloss. Gloss at 60°: More than 85 units.

1.4 SUBMITTALS

A. Submit in accordance with requirements of Division 1 Section "Submittal Procedures."

B. Samples: Samples of mixed paint, wood stain/clear coating and clear coating applied to surfaces approximating job conditions with test areas painted on job if required. 12-inch x 12-inch minimum size of samples. Obtain preliminary approval of samples before doing any work on job.

C. Complete materials list indicating all materials proposed for use; show manufacturer's name, material type and name, color name and formulation, gloss level, and location where material will be used. Revise list for changes made during construction and resubmit. Where paint provided varies from specified manufacturer's product, submit product data for both the specified basis of design product and proposed paint product. Clearly note any variance between submitted product data and specified product data.

D. Paint manufacturer certification of compliance with the VOC and chemical component limits of Green Seal requirements.

1. Flat paint: Maximum of 50 grams/liter VOC.

2. Non-flat paints and Primers: Maximum of 150 grams/liter VOC.

E. Painting subcontractor's PDCA membership status for national, state, and local levels.

1.5 QUALITY ASSURANCE

A. Paints and coatings shall comply with the VOC and chemical component limits of Green Seal requirements.

B. Painter shall be a PDCA member at national, state, and local levels.

C. Mock-ups:

1. Brush-out areas, 5-feet x 5-feet, as selected by Architect for each color and gloss level for review and prior to final color approval. After acceptance of color brush out, use that work as the reference standard to be matched by subsequent completed work.

2. 10 l.f. of paint color and finish for handrails, trim, and other linear elements of in-place surfaces. Acceptable samples may be incorporated into the Work.

3. One brush-out area of approximately 100 s.f. painted with the predominate wall color in a well-lit area selected by Architect. Paint 100 s.f. of primer, 70 s.f. of first finish coat and 40 s.f. of second finish coat such that the completed mock-up will have three levels of paint, i.e., primer only, primer plus one finish coat, and primer plus two finish coats. Leave approved mock-up in place during painting as a standard of comparison to

finished work. At completion of painting, repaint mock-up wall as necessary to conceal all lap marks.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Designate one location for the storage and mixing of materials. Keep location in a neat and clean condition at all times.

B. Deliver materials only when building is closed in and completed sufficiently to prevent freezing and other damage to paint products.

C. Deliver all materials to the job site in new and unopened containers, with the manufacturer's name, brand name, batch number, color, directions for tinting, mixing and application on a printed label on every container.

1.7 MAINTENANCE

A. Extra Materials: Furnish one gallon of each color and paint type for future repairs, packaged and labeled at the factory. Extra paint shall be mixed at the same time as paint installed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Paint Manufacturers:

1. PPG Amercoat.

2. Benjamin Moore.

3. Burke Industrial Coatings.

4. Kelly-Moore.

5. R.J. McGlennon.

6. Miller.

7. PPG Paints.

8. Rodda.

9. Sherwin Williams.

10. USG.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Provide paint products from one or more manufacturers as required to comply with the color/gloss level/product type combinations. The gloss level of manufacturer's product numbers in this specification may not match the required gloss level specified. Adjust manufacturer's product numbers within the same quality line to match the required gloss level.

B. Exterior:

1. Enamel, Gloss Level 5, on Metal (System A):

a. Prime Coat:

(1) Ferrous Metals, Galvanized Metals, and Non-ferrous Metals:

(a) First coat latex metal primer.

(b) Manufacturers: PPG Pitt Tech Primer Finish DTM 90-712.

(2) Precoated Metal (PVDF): Treat painted surfaces with solvent and prime with epoxy.

(a) Solvent Manufacturers: PPG Amercoat "Amerase."

(b) Epoxy Primer Manufacturers: PPG ADS 510 EPOXY PVDF Bonding Primer

b. Second and Third Coats:

(1) Water-based alkyd enamel, gloss level 5.

(2) Manufacturers: PPG Speedhide WB Alkyd Semi Gloss 6-1510

2. Acrylic, Gloss Level 4, on Fiber Cement Siding (System B):

a. New Wood Prime Coat:

(1) Acrylic bonding primer.

(2) Manufacturer: PPG Seal Grip Acrylic Universal Primer 17-921.

b. First and Second Coats over Existing Paint, Second and Third Coats over Primer:

(1) Exterior 100% acrylic latex, gloss level 4.

(2) Manufacturer: PPG Speedhide Exterior 100% Acrylic Satin 6-2045XI. (Gloss Level 4)

C. Interior:

1. Enamel, Gloss Level 5, on Metal: Same as Exterior Metal Surfaces (System A).

2. Acrylic, Gloss Level 5, on Gypsum Plaster Surfaces (System F):

   a. Prime Coat:

      (1) Acrylic primer.

      (2) Manufacturer: PPG “Speedhide Zero VOC Latex Sealer 6-4900XI Primer-Sealer."

   b. Second and Third Coats:

      (1) 100% acrylic latex, gloss level 5, roller- or brush-applied, no spray permitted.

      (2) Manufacturer: PPG “Speedhide Zero VOC Semi Gloss 6-4510XI.”

3. Water-Based Acrylic, Gloss Level 5, on Wood (System H):

   a. Prime and Backprime Coat:

      (1) Water-based acrylic wood primer.

      (2) Manufacturer: PPG “Seal Grip FD Latex Wood Primer 17-9517 Primer."

   b. Second and Third Coats:

      (1) Interior water-based alkyd enamel, gloss level 5.

      (2) Manufacturer: PPG “Speedhide WB Alkyd Semi-Gloss 6-1510.”

4. Acrylic, Gloss Level 2, on Gypsum Board (System J):

   a. Prime Coat:

      (1) Vinyl acrylic latex primer.

      (2) Manufacturer: USG "Sheetrock Brand Primer Surfacer Tuff-Hide."

      (3) PPG Paints Speedhide MaxBuild Surfacer 6-1

   b. Second and Third Coats:

      (1) 100% acrylic latex, gloss level 2.

      (2) Manufacturer: PPG “Speedhide Zero VOC Latex Eggshell 6-4310XI,” 4-10 @ 60.

5. Acrylic, Gloss Level 3, on Gypsum Board (System K):

   a. Prime Coat:

      (1) Vinyl acrylic latex primer.

      (2) Manufacturer: USG "Sheetrock Brand Primer Surfacer Tuff-Hide."

      (3) PPG Paints Speedhide MaxBuild Surfacer 6-1

   b. Second and Third Coats:

      (1) 100% acrylic latex, gloss level 3. Gloss Level 10 – 35 @ 85, 10 – 25 @ 60.

      (2) Manufacturer: PPG “Speedhide Zero VOC Latex Satin 6-4410XI,” 10-20 @ 60

6. Acrylic, Gloss Level 4, on Gypsum Board (System L):

   a. Prime Coat:

      (1) Vinyl acrylic latex primer.

      (2) Manufacturer: USG "Sheetrock Brand Primer Surfacer Tuff-Hide."

      (3) PPG Paints Speedhide MaxBuild Surfacer 6-1

   b. Second and Third Coats:

      (1) Vinyl acrylic latex, gloss level 4.

      (2) Manufacturer: PPG “Ultra Hide 150 Interior Lo Luster Latex 1433,” 20-30 @ 60.

7. Acrylic, Gloss Level 5, on Gypsum Board (System M):

   a. Prime Coat:

      (1) Vinyl acrylic latex primer.

      (2) Manufacturer: USG "Sheetrock Brand Primer Surfacer Tuff-Hide."

      (3) PPG Paints Speedhide MaxBuild Surfacer 6-1

   b. Second and Third Coats:

      (1) 100% acrylic latex, gloss level 5.

(2) Manufacturer: PPG “Speedhide Zero VOC Latex Semi-Gloss 6-4510XI,” 35-50 @ 60.

8. Epoxy, Gloss Level 5, on Gypsum Board (System N):

a. Prime Coat:

(1) Vinyl acrylic latex primer.

(2) Manufacturer: USG "Sheetrock Brand Primer Surfacer Tuff-Hide."

(3) PPG Paints Speedhide MaxBuild Surfacer 6-1

b. Second and Third Coats:

(1) Waterborne polyamide epoxy, gloss level 5.

(2) Manufacturer: PPG “Pitt-Glaze WB1 Pre Catalyzed WB Epoxy Semi Gloss 16-510.”

9. Wood Stain/Clear Coating, Gloss Level 5, on Wood (WSC):

a. AWI System post-catalyzed lacquer.

b. Stain:

(1) Interior semi-transparent lacquer wood stain.

(2) Manufacturer: R.J. McGlennon "Maclac 16 Series Reduced VOC Polystain."

c. Prime Coat:

(1) Catalyzed lacquer, gloss level 5, thinned 50%.

(2) Manufacturer: R.J. McGlennon "Chemlac F-104."

d. Second and Third Coats:

(1) Catalyzed lacquer, gloss level 5.

(2) Manufacturer: R.J. McGlennon "Chemlac F-104."

10. Clear Coating, Gloss Level 4, on Wood (CC):

a. AWI System post-catalyzed lacquer.

b. Prime Coat:

(1) Catalyzed lacquer, thinned 50%.

(2) Manufacturer: R.J. McGlennon "84 Series LVH-101 Low VOC Chemlac."

c. Second and Third Coats:

(1) Catalyzed lacquer, gloss level 4.

(2) Manufacturer: R.J. McGlennon "84 Series LVH-101 Low VOC Chemlac."

PART 3 EXECUTION

3.1 PROTECTION

A. Protection of Surfaces and Cleaning: Protect floors and other adjoining surfaces from paint droppings and spillage of materials.

3.2 SURFACE PREPARATION

A. General:

1. Carefully examine all surfaces over which finish is to be applied. Any surface not suitable for the proper finish which cannot be rectified by light sanding, cleaning, etc., must be brought to the attention of the Architect before any materials are applied. Do not proceed with the work until such conditions have been rectified. Beginning work denotes acceptance of substrates.

2. All surfaces shall be thoroughly dry before any finish is applied and application shall not be done in severely cold weather except under instructions from the Architect.

B. Wood:

1. Prime and back prime all woodwork immediately upon receipt at the job. Required for all wood finish and trim unless material has been pressure preserved or dip treated and sealed. One coat primer or undercoat as used for finishing on painted work, or one coat sealer compatible with finish coats on transparent/stain finished work.

2. Properly sand wood surfaces before any paint is applied. Knots or sappy places shall be given one coat of shellac at least twelve hours before being painted. Shellac is not to be used on any other surfaces. Use putty or wood filler of the same shade as the finish coat in filling nail holes, checks, and other blemishes, then lightly sand smooth as soon as filler has hardened.

C. Metal:

1. All metal installation shall be made complete and ready for painting. Touch-up shop or prime coats that have been damaged with material of the same type and quality as

originally used on the shop coat. Thoroughly remove all rust previous to this priming operation.

2. Etch galvanized metal with phosphoric acid solution prior to applying primer.

3. Prepare substrate and apply coatings in strict adherence with coating manufacturer's instructions.

D. Gypsum Board Surfaces: Paint shall not be applied to any surface until it is thoroughly dry and cured. Prime surfaces that show hot spots or alkali in order to prevent such blemishes from showing through the paint. Brush off all loose particles or crystals which may have formed.

E. Existing Painted Surfaces: Prepare by sanding or other procedures necessary prior to application of new paint. Primer only required on surfaces of bare substrate unless needed for adhesion to painted substrate. Verify compatibility of new and old paint prior to application of two top coats.

3.3 APPLICATION

A. Employ workers skilled in the application of paint products specified.

B. When paint mixing is required on the job, perform mixing on the premises immediately before applying, and thoroughly stir and strain all materials. Do not change or reduce any material in any way except as specified by paint manufacturer.

C. Except where method of application is specifically noted, all materials shall be applied by brush or roller. Application by spray only where approved by the Architect. All spray application shall be by airless method only.

D. Coverage and Workmanship:

1. Assume all responsibility for paint coats applied over surfaces and undercoats which have not been inspected and approved by Architect. Apply any additional coats of paint, as directed by Architect, where surface preparation and undercoats have not been approved before painting. Make finished work match approved samples.

2. The visible parts of the structure behind grilles and louvers are to be painted with flat black enamel.

E. Drying: Apply paints to surfaces at atmospheric temperatures of not less than 50°F and maintain this minimum temperature throughout the drying time. Ensure adequate ventilation in all painted spaces. Allow sufficient time to elapse as recommended by the manufacturer, between successive coats, to permit proper drying. Modify as necessary to suit adverse weather conditions.

F. Exterior:

1. Metal: All exposed metal items including handrails and guardrails, flashings, plumbing vents, mechanical equipment, pipe and electrical conduits are to receive a total of three coats of material, as specified above. Shop coat to be considered one coat; touch-up as required.

2. Cellulose Fiber Cement Siding: Apply two coats of material specified above over pre-primed siding.

G. Interior:

1. Wood Enamel: For doors and trim where scheduled. All surfaces are to receive three coats, one prime coat and two coats of enamel. Sheen of finish as specified above or selected. Sand smooth all surfaces after puttying, removing excess putty and prime coat imperfections. Sand lightly between second and third coats. Paint top, bottom and edges of all doors the same number of coats as the door faces after doors have been fitted.

2. Metal Enamel: All surfaces are to receive three coats (total including prime coat) of materials as specified above. All exposed interior metal, including but not limited to, grilles, registers, conduit, pipe, mechanical ducts, etc., in finished room areas are to be painted as called for above.

3. Gypsum Board: All surfaces shall receive three coats of material, as specified above including walls behind tackboards, chalkboards, markerboards acoustical panels and other surface applied accessories. Remove dust from surfaces, clean off or seal all stains and marks which may show or bleed through finishes.

4. Veneer Plaster: Apply one prime coat and two finish coats of material specified above.

5. Wood Stain/Clear Coating: For doors, door frames, standing and running trim, and other surfaces where scheduled. Paint top, bottom, and edges of door the same number of coats as the door faces after doors have been fitted.

   a. Stain: Two coats stain, color to match Architect's sample. Brush apply and wipe down while damp.

   b. Coating: Two coats brush-applied.

6. Clear Coating: For wood doors, door frames and other wood surfaces where scheduled. One coat each of primer, undercoating, and finish coat. Paint top, bottom, and edges of door the same number of coats as the door faces after doors have been fitted.

7. Epoxy Finish on Gypsum Board: Apply one prime coat and two finish coats using manufacturer's application instructions.

3.4 COLOR SCHEDULE

A. Refer to Finish Material Legend.

END OF SECTION

PANEL SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of interior one-piece polymer plaque signs.

1. Work of this Section includes:

a. Fire/life/safety and code-required signs.

b. Fabrication, installation and any necessary sign permits for all signs in this package.

c. Costs related to artwork shall be considered a part of the Work for this Section.

1.2 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Shop Drawings:

1. Indicate sign layout, typical letter spacing, letter profile, dimensions, and connection details.

2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

C. Product Samples:

1. Submit one full size polymer sign.

2. Acceptable samples may be incorporated in the Work.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of polymer finishes beyond normal weathering.

b. Deterioration of embedded graphic image colors and sign lamination.

B. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Laminated and One-Piece Polymer Signs:

1. Center Pointe Signs, 503-259-8855.

2. Meyer Sign Co. of Oregon, Inc., 503-620-8200.

3. Architectural Metalcrafters, Inc., 503-557-7686.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section “Product Requirements.”

2.2 FABRICATION OF SIGNS

A. One-Piece Polymer Plaque Signs:

1. Plaque Sizes: As detailed.

2. Background Color: Color as selected by Architect from manufacturer’s standard colors.

3. Copy: As detailed.

4. Sign Style: Custom.

5. Letter Style: Futura.

6. Letter Sizes: Height as detailed, 1/16-inch raised depth.

7. Letter Color: White.

8. Letter Spacing: Normal.

9. Copy Position: As detailed.

10. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

11. Mounting Method:

a. 3M VHB adhesive tape, vertical strips. Provide anodized aluminum Chemetal plate on opposite glass side of signs mounted on glass. Back plate shall match sign size.

b. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.

12. Sign Corners: Square.

2.3 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into masonry work.

PART 3 EXECUTION

3.1 PREPARATION

A. Verification of Conditions: Starting installation constitutes acceptance of existing substrate conditions.

3.2 INSTALLATION

A. Installation of Polymer Signs:

1. Locate on face of substrate as indicated on Drawings.

2. Secure with tape or other mounting method appropriate for the substrate and environment.

3. Back plates for signs mounted on glass shall align with sign edges.

3.3 COMPLETION

A. Adjusting Defective Work:

1. Relocate misplaced signs.

2. Replace defective or damaged sign components prior to Substantial Completion.

B. Final Cleaning: Clean sign face within seven days prior to Substantial Completion.

END OF SECTION

PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services required for the installation of reinforced composite plastic toilet compartments.

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings showing plan of installation, elevations, and anchorage or support details.

C. Product data for hardware and accessories.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.

B. Installer Qualifications: Minimum 5 years commercial experience in work of this Section.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard 25 year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship. Manufacturer's standard 1 year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product Manufacturer: Bobrick “Sierra Series” 1092.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 FABRICATION

A. Solid Color Reinforced Composite (SCRC) Toilet Partitions: Bobrick SierraSeries.

1. Design Type: Standard Height.

a. Door/Panel Height: 58 inches (147 cm).

b. Floor Clearance: 12 inches (30 cm).

2. Mounting: Floor-mounted, overhead-braced with satin finish, extruded anodized aluminum headrails, 0.065 inch (1.65 mm) thick with anti-grip profile.

   a. Stile Standard Height: 70 inches (178 cm).

B. Solid Color Reinforced Composite (SCRC) Urinal Screens: Bobrick SierraSeries.

1. Mounting Configuration: Wall-hung.

2. Screen Height: 42 inches (107 cm) with 18 inches (46 cm) floor clearance.

C. Materials: Solid color reinforced composite (SCRC) material for stiles, panels, doors, and screens with Bobrick GraffitiOff coating, thermoset and integrally fused into homogenous piece.

1. Composition: Dyes, organic fibrous material, and polycarbonate/phenolic resins.

2. Surface Treatment: Non-ghosting, graffiti resistant surface integrally bonded to core through a manufacturing steps requiring thermal and mechanical pressure.

3. Edges: Same color as the surface.

4. Color: As selected by Architect from manufacturer's standard SierraSeries range.

D. Performance Requirements:

1. Graffiti Resistance (ASTM D 6578): Passed cleanability test; 5 staining agents.

2. Scratch Resistance (ASTM D 2197): Maximum load value exceeds 10 kilograms.

3. Impact Resistance (ASTM D 2794): Maximum impact force exceeds 30 inch-pounds.

4. Smoke Developed Index (ASTM E 84): Less than 450.

5. Flame Spread Index (ASTM E 84): Less than 75.

6. National Fire Protection Association/International Building Code Interior Wall and Ceiling Finish: Class B.

7. International Building Code: Class II.

E. Finished Thickness:

1. Stiles and Doors: 3/4 inch (19 mm).

2. Panels and Screens: 1/2 inch (13 mm).

F. Stiles: Floor-anchored stiles furnished with expansion shields and threaded rods.

1. Leveling Devices: 7 gauge, 3/16 inches (5 mm) thick, corrosion-resistant, chromate-treated, double zinc-plated steel angle leveling bar bolted to stile; furnished with 3/8 inch

(10 mm) diameter threaded rods, hex nuts, lock washers, flat washers, spacer sleeves, expansion anchors, and shoe retainers.

2. Stile Shoes: One-piece, 22 gauge (0.8 mm), 18-8, Type 304 stainless steel, 4 inch (102 mm) height; tops with 90 degree return to stile. One-piece shoe capable of adapting to 3/4 inch (19 mm) or 1 inch (25 mm) stile thickness and capable of being fastened (by clip) to stiles starting at wall line.

G. Wall Posts: Pre-drilled for door hardware, 18-8, Type 304, 16 gauge (1.6 mm) stainless steel with satin finish; 1 inch (25 mm) x 1-1/2 inches (38 mm) x 58 inches high (1473 mm).

H. Anchors: Expansion shields and threaded rods at floor connections as applicable.

I. Hardware: Chrome-plated "Zamak", aluminum, extruded plastic hardware not acceptable.

1. Compliance: Operating force of less than 5 lb (2.25 kg).

2. Emergency Access: Hinges, latch allow door to be lifted over keeper from outside compartment on inswing doors.

3. Materials: 18-8, Type 304, heavy-gauge stainless steel with satin finish.

4. Doorstops: Prevents inswinging doors from swinging out beyond stile; on outswing doors, doorstop prevents door from swinging in beyond stile.

5. Fastening: Hardware secured to door and stile by through-bolted, theft-resistant, pin-in-head Torx stainless steel machine screws into factory-installed, threaded brass inserts. Fasteners secured directly into core not acceptable.

a. Threaded Brass Inserts: Factory-installed; withstand direct pull force exceeding 1500 lb (680 kg) per insert.

6. Clothes Hooks: Projecting no more than 1-1/8 inch (29 mm) from face of door.

7. Door Hardware Type:

a. Institutional Hardware:

(1) Latching: 14 gauge (2 mm) sliding door latch, 11 gauge (3.2 mm) keeper; latch slides on a shock-resistant nylon track.

(2) Hinges: 16 gauge (1.6 mm) stainless steel, self-closing, 3 section hinges.

8. Fittings:

a. Institutional Hardware:

(1) Mounting Brackets: 18 gauge (1.2 mm) stainless steel and extend full height of panel.

(2) U-Channels: Secure panels to stiles.

(3) Angle Brackets: Secure stiles-to-walls and panels to walls.

PART 3 EXECUTION

3.1 INSTALLATION

A. Compartment installation by skilled workers approved by manufacturer. Conform to manufacturer's instructions. Horizontal lines level and at correct elevations. Vertical members and lines plumb.

B. Verify and coordinate the proper installation of additional supports, bracing, and blocking in building walls, and floors to receive anchorage fastenings. Drill and tap concealed metal supports to receive machine bolts as required.

C. Use fasteners and anchors suitable for substrate and project conditions.

D. Install units rigid, straight, plumb, and level.

E. Conceal evidence of drilling, cutting, and fitting to room finish.

3.2 ADJUSTING AND CLEANING

A. Set hinges to close or hold open as directed. Clean panels and hardware and adjust hardware for perfect fit and operation. Repair or replace damaged finishes and construction if caused by this work.

END OF SECTION

CORNER GUARDS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment, and services necessary for the installation of corner guards.

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings and manufacturer's product data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product manufacturers are listed below.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Corner Guards:

1. Cement-on type, 16 gauge, Type 304 stainless steel, No. 4 satin finish, including required cement and application spatula, profile as required for corner condition.

2. Lengths: 48-inches to 96-inches, lengths as detailed.

3. Wing Size: 1.5-inches x 1.5-inches.

4. Corner Radius: 1/8-inch.

5. Manufacturers:

a. ARDEN Architectural Specialties, Inc.

b. American Floor Products Co., Inc.

c. Balco,Inc.

d. Construction Specialties, Inc.

e. IPC Door and Wall Protection Systems; Division of InPro Corp.

f. Pawling Corporation.

g. Architectural Specialties, Inc.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions and recommendations.

B. Clean the corner of wall of loose particles and dust. Apply plastic cement to the back of corner guards and place on the corner, pressing firmly in place. Remove excess cement at edges and allow to dry for 24 hours.

END OF SECTION

TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services required for the installation of toilet and bath accessories. Supply in type, size, number and kind necessary to complete the work. Examine the Drawings for locations and any special installation details.

1.2 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings showing detail of any modifications required to suit the installation.

C. Manufacturer's detail sheets showing installation details, listing all necessary parts and accessories, and listing color or finish options unless special finish is specified.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Specification is based on Bobrick Washroom Equipment; Bradley Corp. approved.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Furnish type of accessories for each room as scheduled. Furnish all items with chrome plated or stainless steel finish unless specifically noted otherwise. Furnish scribe filler strips at all mirror installations where overlapping ceramic tile wainscot.

B. Abbreviations: The following abbreviations are listed for identification of accessories in locations as detailed. Model numbers starting with “B” are Bobrick products.

Abbrev.	Item	Model No.
CH	Coat hooks	B-6827
GB	Grab bars	B-6106.99 Series, lengths as noted on Drawings
MR	Mirror	Reuse existing
SND	Sanitary napkin dispenser	Reuse existing
SNR	Sanitary napkin receptacle	Reuse existing
PTD	Paper towel dispenser	Reuse existing
PTR	Paper towel receptacle	Provided by Owner

SCD ..... Seat cover dispenser ..... Reuse existing
SD..... Soap dispenser..... Reuse existing
TPH ..... Toilet paper holder ..... Reuse existing

PART 3 EXECUTION

3.1 INSTALLATION

A. Install all accessories in accordance with published standard specifications and manufacturer's recommendations. Verify required installation variations with Architect before proceeding with the work.

B. Verify that walls and surfaces to which accessories are to be mounted are reinforced or provided with backing or blocking for solid anchorage. Provide fasteners long enough to penetrate into solid anchorage. Fastening with toggle bolts, molly screws, or similar fittings not permitted.

3.2 ADJUSTING

A. Damaged Items: Bent, dented, and racked items are not acceptable. Field repairs not permitted. Refinish scratched and abraded finishes equal to original finish and indistinguishable from adjacent surfaces.

END OF SECTION

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of fire extinguishers and cabinets.

1.2 REFERENCES

A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 2007.

B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section "Submittal Procedures."

B. Shop drawings.

C. Manufacturer’s product information.

1.4 REGULATORY REQUIREMENTS

A. Fire Extinguishers: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product Manufacturers:

1. J.L. Industries, div. of J.N. Johnson Co.

2. Larsen’s Manufacturing Company.

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Cabinets:

1. FEC-1, Semi-Recessed: J.L. Industries " Ambassador Model 1017" with 3-inch return.

2. Door Style: J.L. Industries "V" contemporary vertical duo, door glazing No. 10 clear acrylic, vertical lettering.

B. Fire Extinguishers: UL rated 4A-80BC, J.L. Industries “Cosmic 10E," steel shell, 5-inch cylinder diameter, 20-1/2-inches high, provide one in each cabinet and one on each wall hanger.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install cabinets in accordance with manufacturer’s instructions. Refer to Drawings for wall construction and thickness for verification of requirements of semi-recessed cabinets and hardware and fasteners for installation. Set cabinets neatly and securely in place, plumb and true to building lines.

END OF SECTION

ROLLER SHADES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish labor, material and equipment necessary for the installation of roller shades as detailed, including:

1. Manually operated sunscreen roller shades.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. National Fire Protection Association (NFPA).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

3. Storage and handling requirements and recommendations.

4. Mounting details and installation methods.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware.

H. Warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-2010 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

E. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years.

1.5 DELIVERY, HANDLING, AND STORAGE

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

A. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.

B. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. “MechoShade” by MechoShade Systems, 718/729-2020.

B. Hunter Douglas Architectural, 800-727-8953.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section “Product Requirements.”

2.2 APPLICATION/SCOPE

A. **SH-1: Manual operating, chain drive, sunscreen roller shades at Cashiers Window.**

1. MechoShade “Mecho 5.”

2.3 SHADE CLOTH

A. Room darkening (PVC Free) Shadecloth with opaque acrylic backing: MechoShade Systems, Inc., "Equinox 0100 series", .008 inches thick (.19 mm) blackout material and weighing .94 lbs. per square yard, comprising of 53% fiberglass, 45% acrylic, 2% poly finish.

1. Color: Selected from manufacturer's standard colors.

2.4 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.

2. Shade band and Shade Roller Attachment:

a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades are not acceptable.

b. Provide for positive mechanical engagement with drive / brake mechanism.

c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.

d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.

e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

1. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as concealed hemtube.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

C. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.

D. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque.

2.6 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

2. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

3. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

4. Drive Bracket / Brake Assembly:

a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories.

b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.

c. The brake shall be an over -running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.

d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.

e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.

5. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

C. Roller Tube assembly:

1. Roller tube of one piece extruded aluminum tube, with 10 micron thick clear anodized coating, at the manufacturer's recommended engineered diameter and wall thickness for maximum allowable deflection of L/700; mill finish aluminum tubes not acceptable.

2. The roller tube shall be extruded with provision made for mechanical engagement with the operator and drive assembly.

3. The extrusion shall have various channels to accept fabric attachment spline. The spline and slot reinforces the tube and retains the fabric and operating system.

4. The spline shall be an extruded vinyl profile, welded to the fabric band or panel, such that removal and re-installation of the fabric band or panels shall be without removing the roller tube and hardware. Fabric bands or panels must be replaceable on site. Attachment of the fabric to the tube with double-sided adhesive tapes, adhesives, staples or rivets not acceptable.

D. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

E. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range, unless otherwise indicated.

F. Aluminum Finishes:

1. All exposed aluminum shall be clear anodized oxide finish according to AA-M12C22A31.

2. Unexposed aluminum: Mill finish.

2.7 ACCESSORIES

A. Roller Shade Pocket for recessed mounting in acoustical tile or drywall ceilings as indicated on the Drawings.

1. Provide either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.

PART 3 EXECUTION

3.1 EXAMINATION

A. Take field measurements prior to fabrication to ensure fit.

3.2 INSTALLATION

A. Install work by manufacturer's skilled tradesmen and installed in strict accordance with manufacturer's recommendations.

B. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

C. The fabric shall be pre-measured and manufactured off-site.

3.3 ADJUSTING AND CLEANING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

B. Adjust shade and shade cloth to hang flat without buckling or distortion.

C. Clean shades and exposed components.

D. Replace work which cannot be satisfactorily repaired, adjusted or cleaned.

E. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

END OF SECTION

BULLET RESISTANT FIBERGLASS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all labor, material, equipment and services necessary for the installation of bullet resistant fiberglass.

B. Related Sections:

1. Division 6 Sections “Rough Carpentry” and “Architectural Woodwork.”

1.2 REFERENCE

A. Underwriters Laboratory UL 752 9th Edition, Standard for Bullet Resisting Equipment dated Jan. 27, 1995.

B. American Society for Testing and Materials, ASTM E119-00e Standard Test for One Hour Fire Rating of building construction and materials.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Through the design, manufacturing technique and material application the bullet resistant fiberglass shall be of the "non-ricochet type." This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with Division 1 Section "Submittal Procedures."

B. Submit for approval prior to fabrication catalog cuts, brochures, specifications, UL listing verification, proof of possession of product liability insurance in an amount not less than five million U.S. dollars, and printed data in sufficient detail to indicate compliance with the contract documents and the manufacturer's instructions for the installation of bullet resistant fiberglass.

C. Furnish verification of compliance with ASTM E119-00e one hour fire rating from a recognized testing laboratory.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver the materials to the project with the manufacturer’s UL Labels intact and legible. Handle the material with care to prevent damage. Store the materials inside under cover, stack flat and off the floor.

1.6 WARRANTY

A. All materials and workmanship shall be warranted against defects for a period of two (2) year from the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Safeguard Security Services, Ltd., 800/880-8306.

B. Insulgard Security Products, 800-624-6315.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section "Product Requirements."

2.2 MATERIALS

A. Bullet resistant fiberglass panels made of multiple layers of starch-oil woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile. Bullet resistant fiberglass panels shall be UL 752 listed, rated for level 2 and level 7.

1. Level 2: Cashier's window.

a. Safeguard Security Services "Armortex OF 200."

b. Insulgard "FG 200."

2. Level 7: Council chambers.

a. Safeguard Security Services "Armortex OF 700."

b. Insulgard "FG 700."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Supporting Members: Prior to installing the bullet resistive material, verify that all supports have been installed as required by the Contract Documents.

3.2 INSTALLATION

A. Joints: All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer at joint shall be 4" (2" on each panel or a 2" minimum overlap).

B. Armor shall be installed in accordance with the manufacturer's printed recommendations. Armor panels shall be adhered using an industrial adhesive, mastic, screws or bolts. Space screws 12-inches o/c in the field and 6-inches o/c at edges at each stud. Allow 1/4-inch space between rigid substrate and non-threat side of fiberglass panel.

C. Method of application shall maintain the bullet resistive rating at junctures with the concrete floor

slab, the bullet resistive window frames, and all required penetrations.

END OF SECTION

COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.1 SUMMARY

A. The intent of Division 22, Plumbing and the accompanying Drawings is to provide a complete and workable facility with complete systems as shown, specified and required by applicable codes. Include all work specified in Division 22, Plumbing and shown on the accompanying Drawings, including appurtenances, connections, etc., in the finished job.

B. Division 22, Plumbing and the accompanying Drawings are complementary and as binding as if called for by both. Items shown on the Drawings are not necessarily included in the Specifications and vice versa. Specifications supersede drawings in case of conflict.

C. The Drawings that accompany the Division 22, Plumbing, are diagrammatic. They do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Offsets and transitions assumed at a minimum at each duct crossing, structural penetrations through shear walls or beams, structural grids where ceiling heights are restricted, and at piping mains. Follow the Drawing as closely as is practical to do so and install additional bends, offsets and elbows where required by local conditions from measurements taken at the Building, subject to approval, and without additional cost to the Owner. The right is reserved to make any reasonable changes in fixture location prior to roughing-in, without cost impact.

D. The General and Supplemental Conditions apply to this Division, including but not limited to:

1. Drawings and specifications.

2. Public ordinances, permits.

3. Include payments and fees required by governing authorities for work of this Division.

1.2 RELATED SECTION

A. Division 01, General Requirements

B. Division 22, Plumbing

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Products and equipment prohibited from containing pentabrominated, octabrominated and decabrominated diphenyl ethers. Where products or equipment within this specification contain these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.

2. General:

a. Conform work and materials to local and State codes, and Federal, State and other applicable laws and regulations.

3. Responsible for obtaining and payment for permits, licenses, and inspection certificates required in accordance with provisions of Contract Documents.

B. New materials and equipment. Work of good quality, free of faults and defects and in conformance with the Contract Documents.

C. Build and install apparatus to deliver its full rated capacity at the efficiency for which it was designed.

D. Operate the entire plumbing system and apparatus at full capacity without objectionable noise or vibration.

E. Install equipment level and true. Use housekeeping pads and curbs to account for floor or roof slope.

F. Materials and Equipment:

1. Meet detailed requirements of the Drawings and Specifications and suitable for the installation shown. Equipment not meeting requirements will not be acceptable, even though specified by name along with other manufacturers.

2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer. Component parts of the entire system need not be products of same manufacturer.

3. Furnish materials and equipment of size, make, type, and quality herein specified.

4. Equipment scheduled by performance or model number considered the basis of the design. If other specified manufacturer's equipment is provided in lieu of the basis of design equipment the contractor is responsible for changes and costs which may be necessary to accommodate this equipment, including different sizes and locations for connections, different electrical characteristics, different dimensions, different access requirements or any other differences which impact the project.

G. Workmanship:

1. General:

a. Install materials in a neat and professional manner.

2. Manufacturer’s Instructions:

a. Follow manufacturer’s directions where they cover points not specifically indicated.

b. If in conflict with the Drawings and Division 22, Plumbing, obtain clarification before starting work.

H. Cutting and Patching:

1. Cutting, patching, and repairing for the proper installation and completion of the work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting performed by skilled craftsmen of each respective trade in conformance with the appropriate Division of Work.

2. Additional openings required in building construction made by drilling or cutting. Use of jackhammer is specifically prohibited.

3. Fill holes which are cut oversize so that a tight fit is obtained around the sleeves passing through.

4. Do not pierce beams or columns without permission of Architect and then only as directed.

5. Restore new or existing work cut or damaged to its original condition. Where there are alterations disturb lawns, paving, walks, etc., repair, refinish, and leave in condition existing prior to commencement of work.

1.4 SUBMITTALS

A. Shop Drawings:

1. Contract Drawings indicate the general layout of the piping, and various items of equipment.

2. Coordinate with other trades and field conditions.

3. Prepare Shop Drawings of piping, and equipment installations.

4. Prepare new Shop Drawings by Contractor and not reproductions or tracings of Architect's Drawings.

5. Overlay drawings with shop drawings of other trades and check for conflicts.

6. Drawings same size as Architect's Drawings with title block similar to Contract Drawings and identifying Architect's Drawing number or any reference drawings.

7. Fully dimensioned including both plan and elevation dimensions.

8. Shop drawings cannot be used to make scope changes.

9. Prepare in two-dimensional format.

10. Shop drawings include but are not limited to:

a. Plumbing site plan drawn to same scale as site plan.

b. Complete floor plans with plumbing to a minimum of 1/4-inch equals 1-foot scale.

c. Plumbing in mechanical rooms to a minimum of 1/2-inch equals 1-foot scale.

d. Sections of congested areas to a minimum of 1/2-inch equals 1-foot scale.

e. Fabricated Equipment: Scale and drawing sizes to suit contractor except equipment not less than 1/2-inch equals 1-foot scale.

f. Superplot plans of above ground work with a colored overlay of all trades including, but not limited to, HVAC piping, HVAC equipment, plumbing piping and equipment, sprinklers, lighting, lighting controls, cable tray, fire alarm devices, electrical power conduit, and ceiling system to a minimum of 1/2-inch equals 1-foot scale.

g. Superplot plans of below ground work with a colored overlay of all trades including, but not limited to, structural footings and foundation, HVAC piping, civil piping, plumbing piping, and power conduit to a minimum of 1/2-inch equals 1-foot scale.

h. Beam penetration drawings indicating beam penetrations meeting the requirements indicated on the floor plans and on the structural drawings to a minimum of 1/4-inch equals 1-foot scale.

i. Slab penetration drawings of HVAC, plumbing, sprinklers, lighting and electrical to a minimum of 1/4-inch equals 1-foot scale.

11. Submit shop drawings for review prior to beginning fabrication. Additional shop drawings may be requested when it appears that coordination issues are not being resolved in the field or when there is a question as to whether contract documents are being complied with or the design intent is being met.

B. Product Data:

1. Submit product data for review on scheduled pieces of equipment, on equipment requiring electrical connections or connections by other trades, and as required by each specification section or by Drawing notes. Include manufacturer's detailed shop drawings, specifications and data sheets. Data includes the following:

a. Capacities

b. RPM

c. BHP

d. Pressure Drop

e. Design and Operating Pressures

f. Temperatures

2. Manufacturer's abbreviations or codes are not acceptable.

3. List the name of the motor manufacturer and service factor for each piece of equipment.

4. Indicate equipment operating weights including bases and weight distribution at support points.

5. In the case of equipment such as wiring devices, time switches, valves, etc., specified by specific catalog number, a statement of conformance will suffice.

C. Submission Requirements:

1. Shop Drawings and Product Data:

a. Refer to Division 01, General Requirements for additional requirements related to submittals.

b. Submit copies of shop drawings and product data for Work of Division 22, Plumbing in a 3-ring loose leaf binder with each item filed under a tab and labeled with its respective specification section number, article and paragraph, and mark if applicable.

c. Submit electronic copies of shop drawings and product data for Work of Division 22, Plumbing in PDF format with each item filed under a folder and labeled with its respective specification section number, article, and paragraph and mark, if applicable.

d. Include a complete index in the original submittal. Indicate both original items submitted and note stragglers that will be submitted at a later date to avoid delay in submitting.

e. The bulk of the shop drawings and product data, excepting Controls and Instrumentation, included with the original submittal. Controls and Instrumentation submittals may lag but still complete when submitted. Partial submittals will not be accepted. Other stragglers submitted after return of the original binder includes a tab similar to that originally submitted. Upon receipt of the returned late submittal, insert them in the previously submitted binder.

D. Contractor Responsibilities:

1. Submit submittals at one time and are in proper order.

2. Ensure equipment will fit in the space provided.

3. Assure that deviations from Drawings and Specifications are specifically noted in the submittals. Failure to comply will void review automatically.

1.5 AS-BUILT DRAWINGS

A. Provide record drawings in hard copy and pdf format. Drawings include the following:

1. Project specific titleblock.

2. Notations reflecting the as built conditions of any additions to or variations from the construction documents provided as part of the BIM coordination, RFIs, ASIs, Owner Changes, and Field Coordination.

1.6 OPERATING AND MAINTENANCE MANUAL, PARTS LISTS, AND OWNER'S INSTRUCTIONS

A. Refer to Division 01, General Requirements for additional requirements.

B. Submit three bound copies of manufacturer's operation and maintenance instruction manuals and parts lists for each piece of equipment or item requiring servicing. Show literature on 8-1/2-inches by 11-inches sheets or catalogs suitable for side binding.

C. Submit data when the work is substantially complete, packaged separately, and clearly identified in durable 3-ring binder. Include name and contact information for location of source parts and service for each piece of equipment.

D. Clearly mark and label in each submittal, the piece of equipment provided with the proper nameplate and model number identified. Provide wiring diagrams for electrically powered equipment.

E. Instruct Owner thoroughly in proper operation of equipment and systems, in accordance with manufacturer's instruction manuals. Operating instructions cover all phases of control.

1.7 PROJECT CONDITIONS

A. Existing Conditions:

1. Prior to bidding, verify and become familiar with existing conditions by visiting the site, and include factors which may affect the execution of this Work.

2. Include related costs in the initial bid proposal.

B. Coordinate exact requirements governed by actual job conditions. Check information and report any discrepancies before fabricating work. Report changes in time to avoid unnecessary work.

C. Coordinate shutdown and start-up of existing, temporary, and new systems and utilities. Notify Owner, City, and Utility Company.

1.8 WARRANTY

A. Provide a written guaranty covering the work of this Division (for a period of one calendar year from the date of acceptance by the Owner) as required by the General Conditions.

B. Provide manufacturer's written warranties for material and equipment furnished under this Division insuring parts and labor for a period of one year from the date of Owner acceptance of Work of this Division.

C. Correct warranty items promptly upon notification.

1.9 TEST REPORTS AND CERTIFICATES

A. Submit one copy of test reports and certificates specified herein to the Architect.

1.10 SUBSTITUTIONS

A. Submit requests for product substitutions in accordance with the Instructions to Bidders and the General and Supplemental Conditions.

PART 2 PRODUCTS

2.1 ACCESS PANELS

A. Furnish under this Division as specified in another Division of work.

2.2 PIPE SLEEVES

A. Interior Wall and Floor Sleeves: 18 gauge galvanized steel, or another pre-approved system.

B. Interior Wall and Floor Sleeves, Fire Rated: Fire rated and water tight system approved by Authority Having Jurisdiction and Owners Insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping material, size and service.

C. On Grade Floor Sleeves: Same as exterior wall sleeves.

D. Water Tight Sleeves: Combination steel pipe sleeves with water stop and anchor plate; Link Seal Model WS, mated with synthetic rubber links interlocked with bolts and nuts; Link Seal Model LS.

2.3 FLOOR, WALL AND CEILING PLATES

A. Furnish stamped split type plates as follows:

1. Floor Plates: Cast brass, chromium plated

2. Wall and Ceiling Plates: Spun aluminum

PART 3 EXECUTION

3.1 SLEEVES

A. Interior Floor and Wall Sleeves:

1. Provide sleeves large enough to provide 3/4-inch clearances around pipe or ductwork. Where pipe or ductwork is insulated, insulation pass continuously through sleeve with 3/4-inch clearance between insulation and sleeve.

2. Penetrations through mechanical room and fan room floors made watertight by packing with safing insulation and sealing with Tremco Dymeric Sealant or approved system.

B. Sleeves Through Rated Floors and Walls:

1. Similar to interior sleeves except install fire rated system approved by Authority Having Jurisdiction and Owners insurance underwriter

2. Rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping material, size and service.

C. Layout work prior to concrete forming. Do cutting and patching required. Reinforce sleeves to prevent collapse during forming and pouring.

D. Floor sleeves maintain a water barrier by providing a water tight seal or they extend 1-inch above finished floor except through mechanical equipment room floors and shafts where sleeves extend 2-inches above finished floor level. Sleeves through roof extend 8-inches above roof. Wall sleeves flush with face of wall unless otherwise indicated. Waste stacks using carriers have sleeves flush with floor and sealed. Sleeves through planters extend 8-inches above planter base.

E. Do not support pipes by resting pipe clamps on floor sleeves. Provide supplementary members so pipes are floor supported.

F. Special sleeves detailed on drawings take precedence over this Section.

3.2 CLEANING

A. General: Clean plumbing equipment, fixtures and piping of stampings and markings (except those required by codes), iron cuttings, and other refuse.

B. Painted Surfaces: Clean scratched or marred painted surfaces of rust or other foreign matter and paint with matching color industrial enamel, except as otherwise noted.

C. Additional requirements are specified under specific Sections of this Division.

3.3 EQUIPMENT PROTECTION

A. Keep pipe and conduit openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, conduit, fixtures, equipment, and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore damaged or contaminated fixtures, equipment, or apparatus to original conditions or replace at no cost to the Owner.

B. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.

C. Cover or otherwise suitably protect equipment and materials stored on the job site.

3.4 ACCESSIBILITY

A. General: Locate valves, thermometers, cleanout fittings and other indicating equipment or specialties requiring frequent reading, adjustments, inspection, repairs, and removal or replacement conveniently and accessibly with reference to the finished building.

B. Thermometers and Gauges: Install thermometers and gauges so as to be easily read from the floors, platforms, and walkways.

3.5 FLOOR, WALL AND CEILING PLATES

A. Install on piping and ductwork passing through finished walls, floors, ceilings, partitions, and plaster furrings. Plates completely cover opening around pipe.

B. Secure wall and ceiling plates to pipe, insulation, or structure.

C. Plates not to penetrate insulation vapor barriers.

D. Plates not required in mechanical rooms or unfinished spaces.

3.6 PAINTING

A. General:

1. Coordinate painting of mechanical equipment and items with products and methods in conformance with the appropriate Division of Work, Painting.

2. Exposed work under this division receives either a factory painted finish or a field prime coat finish, except:

3. Exposed copper piping.

4. Aluminum jacketed outdoor insulated piping.

B. Exterior Black Steel Pipe: Wire brush and apply two coats of rust-inhibiting primer and one coat of exterior enamel. Painting schemes comply with ANSI A13.1.

3.7 ADJUSTING AND CLEANING

A. Before operating any equipment or systems, make thorough check to determine that systems have been flushed and cleaned as required and equipment has been properly installed, lubricated, and serviced. Check factory instructions to see that installations made accordingly and that recommended lubricants have been used.

B. Use particular care in lubricating bearings to avoid damage by overlubrication and blowing out seals. Check equipment for damage that may have occurred during shipment, after delivery, or during installation. Repair damaged equipment as approved or replace with new equipment.

3.8 ELECTRICAL EQUIPMENT

A. Do not install piping for plumbing systems not serving electrical space in switchgear room, transformer vault, telephone room, or electric closet except as indicated.

B. Piping for plumbing systems not to pass over switchboards or electrical panelboards. Where conflicts exist, bring to attention of Architect.

3.9 EQUIPMENT CONNECTIONS

A. Make final connections to equipment specified in sections other than Division 22, Plumbing of the specifications and Owner furnished equipment in accordance with manufacturer’s instructions and shop drawings furnished and as indicated.

B. Piping:

1. Connections include hot and cold water, natural gas, sanitary waste and vent,.

2. Provide valves and specialties as specified and as detailed on the Drawings. Provide increasers, reducers, and any other fittings required for complete installation.

3. Independently support piping connections to prevent undue strain on equipment.

END OF SECTION

PIPE AND PIPE FITTINGS PLUMBING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Cast Iron Soil Pipe, Service Weight (No-Hub)
2. Black Steel Pipe, Schedule 40
3. Copper Pipe
4. Copper, Stainless, and Black Steel Grooved Piping System
5. Unions
6. Solder and Brazing
7. Flexible Connector

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 22, Plumbing

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Piping material and installation to meet requirements of the local plumbing, fire, and building codes and serving utility requirements.
2. Provide chlorination of domestic cold and hot water piping in accordance with County and State health requirements.

B. Grooved Joint Couplings and Fittings:

1. Products of a single manufacturer.
2. Grooving tools of the same manufacturer as the grooved components.
3. Castings used for coupling housings, fittings, valve bodies, etc., date stamped for quality assurance and traceability.

C. Pipe Cleaning: If pipe gets plugged or should foaming of water systems occur, disconnect piping, reclean, and reconnect without additional expense to the Owner.

D. Correct damages to the building or systems resulting from failure to properly clean the system without additional expense to the Owner.

E. Products with a wetted surface installed in potable water systems UL classified in accordance with ANSI / NSF-61 for Drinking Water System components, ANSI/NSF-14 for Plastic Piping System Components and certified to the low lead requirements of NSF-372.

1.4 SUBMITTALS

A. Submit the following:

1. List of piping materials indicating the service it is being used for. (Do not submit piping product data).

2. Product data on mechanical couplings and related components, double wall fuel oil pipe and fittings, and polypropylene waste and vent pipe.

B. Test Reports and Certificates: Submit certificates of inspections and pipe tests to Owner.

C. Other: Make certified welders' certificates available.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. As indicated.

2.2 CAST IRON SOIL PIPE, SERVICE WEIGHT (NO-HUB)

A. General: A code approved hubless system conforming to Cast Iron Soil Pipe Institute Standard 301.

B. Pipe and Fittings:

1. Service weight hubless cast iron conforming to ASTM A 888, marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International.

2. Manufacturers:

a. Tyler

b. AB&I

c. Charlotte

C. Gaskets: Compression type conforming to ASTM C 564.

D. Above Grade Couplings: Band type coupling in conformance with Cast Iron Soil Pipe Institute (CISPI) 310-90, consisting of stainless steel clamp, and corrugated shield assemblies with a neoprene sealing sleeve ANSI A21.6, ANSI A21.10 Fittings.

1. Service:

a. Sanitary, storm, and overflow drain.

b. Vent piping 2 inches and above.

2.3 BLACK STEEL PIPE, SCHEDULE 40

A. General:

1. Fittings and joints must be UL listed for use with pipe chosen for use.

2. Listing restrictions and installation procedures per state and local authorities must be followed.

B. Pipe: Schedule 40 conforming to ASTM A 135 or A 53.

C. Fittings:

1. 150 pound screwed malleable iron on 2 inches and below, Schedule 40 welding fittings conforming to ASTM A 234 for 2-1/2 inches and above or mechanical couplings on select piping as herein specified.

2. Welded below grade fittings.

3. Long radius type elbows on pumped systems.

4. Short radius elbows not acceptable for use except as approved on a case by case basis.

D. Service:

1. Natural gas piping and vent lines.

2.4 COPPER PIPE

A. Pipe: Hard drawn copper tubing, Class L or K, ASTM B 88.

B. Fittings:

1. Wrought copper, 150 psi; ANSI B16.22 for soldered joints, ANSI B16.50 for brazed joints; Chase, Revere, Mueller or approved equal.

2. System using mechanically extracted collars in main with branch line inserted to not obstruct flow may be used on domestic water piping above ground, similar to T-drill.

C. Service:

1. Domestic hot and cold water piping above ground (Type L, hard drawn) on piping 4 inches and smaller.

2. Trap priming lines (Type L, annealed).

3. Miscellaneous drains and overflows.

2.5 UNIONS

A. 150 psi malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe. 200 psi WOG bronze, ground joint, solder type for copper tubing.

1. Unions or flanges for servicing or disconnect are not required in installations using grooved mechanical joint couplings. Couplings serve as disconnect points.

B. Dielectric fittings nationally listed, have a dielectric thermoplastic interior lining, and meet requirements of ASTM F1545. Fittings suitable for the pressure and temperature to be encountered.

2.6 SOLDER AND BRAZING

A. Brazed Joints:

1. Wrought Copper Piping Fittings: Westinghouse Phos-Copper or Dyna-Flow by J.W. Harris Co., Inc.

2. Applied locations:

a. Below grade piping.

b. Above grade piping larger than 2-inches for the following services: Industrial cold water, domestic hot and cold water, and pumped waste.

c. Oxygen, nitrous oxide, carbon dioxide, medical vacuum, lab vacuum and lab air. Braze in accordance with Copper Development Association Copper Tube Handbook using BCUP series filler material.

d. Joints in Domestic Hot and Cold Water Piping: Use mechanically extracted collars. Braze in accordance with Copper Development Association Copper Tube Handbook using BCUP series filler material.

e. Solar hot water.

B. Soldered Joints:

1. Wrought Copper Pipe Fittings: All-State 430 with Duzall Flux, Engelhard Silvabrite with Engelhard General Purpose Flux or J.W. Harris Co.

2. Valves, Cast Fittings or Bronze Fittings: Harris Stay-Silv-15 or Handy & Harmon Sil-Fos.

3. Applied locations: Above grade piping 2-inch and smaller for the following services: Industrial cold water, domestic hot and cold water, pumped waste, trap priming lines.

2.7 FLEXIBLE CONNECTOR

A. Expansion Joint/Seismic Connector:

1. T304 stainless steel hose and braid, Schedule 40 radius elbows and 180° bend, flange or weld end Schedule 40 fittings. ASA certified when used for natural gas service. Metraflex Metaloop only.

2. Accept differential support displacement without damaging pipe, equipment connections, or support connections.

3. In steel piping systems, three Victaulic flexible couplings may be used in lieu of a flexible connector for vibration attenuation and stress relief at equipment connections. Place couplings in close proximity to the vibration source.

B. Service:

1. Natural gas piping and vent lines.

2. Miscellaneous drains and overflows.

3. Domestic hot and cold water piping.

PART 3 EXECUTION

3.1 PREPARATION

A. Measurements, Lines and Levels:

1. Check dimension at the building site and establish lines and levels for work specified in this Section.

2. Establish inverts, slopes, and manhole elevations by instrument, working from an established datum point. Provide elevation markers for use in determining slopes and elevations in accordance with Drawings and Specifications.

3. Use established grid and area lines for locating trenches in relation to building and boundaries.

3.2 PIPING INSTALLATION

A. Install unions in non-flanged piping connections to apparatus and adjacent to screwed control valves, traps, and appurtenances requiring removal for servicing so located that piping may be disconnected without disturbing the general system.

B. Dielectric Fittings:

1. Provide dielectric couplings, unions, or flanges between dissimilar metals.

2. Provide dielectric couplings as required to isolate cathodically protected piping and equipment.

C. No-Hub Couplings: Install per manufacturer's instructions.

D. Copper Grooved Piping System: Install in strict accordance with latest manufacturer's published literature.

3.3 PIPING JOINTS

A. Pipe and fittings joined using methods and materials recommended by manufacturer in conformance with standard practice and applicable codes. Cleaning, cutting, reaming, grooving, etc. done with proper tools and equipment. Hacksaw pipe cutting prohibited. Peening of welds to stop leaks not permitted.

B. Purge oxygen, nitrous oxide, nitrogen, medical air, lab vacuum, lab air, nitrogen, and carbon dioxide piping with nitrogen continuously during the piping installation, and seal each branch outlet with Visqueen and tape or similar method to assure continued cleanliness of interior of piping until system is completed.

C. Copper Piping:

1. Pipe cut evenly with cutter, ream to full inside diameter; end of pipe and inside of fitting thoroughly cleaned and polished.

2. Joints uniformly heated, and capillary space completely filled with solder or braze material, leaving full bead around entire circumference.

D. No couplings installed in floor or wall sleeves.

E. Steel Piping:

1. Screwed Joints:

a. Pipes cut evenly with pipe cutter reamed to full inside diameter with burrs and cuttings removed.

b. Joints made up with Teflon liquid dope or Teflon tape applied to male threads only, leaving two threads bare.

c. Joints tightened so that not more than two threads are left showing.

d. Junctions between galvanized steel waste pipe and bell of cast iron pipe made with tapped spigot or half coupling on steel pipe to form spigot end and caulked.

2. Flanged Joints:

a. Pressure rating of flanges match valve or fitting joined.

b. Joint gaskets coated with graphite and oil.

F. Flexible Connector: Provide where indicated on the Drawings.

G. Above Grade No-Hub Couplings: Install in accordance with manufacturer recommendations.

3.4 ADJUSTING AND CLEANING

A. General:

1. Clean interior of piping before installation.

2. Flush sediment out of piping systems after installation before connecting plumbing fixtures to the piping.

3. When placing the water systems in service during construction, each system cleaned in accordance with Section 22 25 00, Plumbing Water Treatment prior to being placed in service.

4. Clean strainers prior to placing in service.

3.5 INSTALLATION, NATURAL GAS PIPING

A. Install piping where shown on Drawings.

B. Black Steel Pipe:

1. Arc-weld joints by certified welders as outlined above.

2. On piping below grade install protective pipe wrap after testing and prior to backfilling in accordance with the manufacturer’s recommendations. Overlap one-half spiral lap for double thickness.

END OF SECTION

PLUMBING FIXTURES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Fixture Trim
2. Plumbing Fixtures
3. Drainage Products

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 22, Plumbing

1.3 QUALITY ASSURANCE

A. Water Closets: Maximum Performance (MaP) score of no less than 800

B. Faucets: Certify to NSF/ANSI 61 and California AB1953

C. Electric Water Coolers and Drinking Fountains: Certified to NSF/ANSI 61 and California AB1953

1.4 SUBMITTALS

A. Submit the following:

1. Product data for each item specified.
2. Operating and Maintenance Data:
    a. Electric Water Coolers
    b. Sensor Operated Faucets
    c. Sensor Operated Flush Valves.
3. Mounting heights for fixtures.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers are stated for each fixture specified. The following manufacturers are also acceptable, except when indicated only.

B. Fixture Trim:

1. Supply Stops:

a. Chicago

b. NPT McGuire (LK series)

c. Brasscraft (SCR series)

C. Drainage Products and Carrier Products:

1. J.R. Smith

2. Josam

3. Sioux Chief

4. Zurn

5. Wade

6. Watts Drainage

7. Woodford

8. Mifab

D. Fixtures:

1. American Standard

2. Kohler

3. Sloan

4. Toto

E. Seats:

1. Olsonite

2. Church

3. Beneke

4. Bemis

F. Electric Water Coolers:

1. Elkay

2. Halsey Taylor

3. Oasis
4. Sunroc
5. Haws

G. Shower/Tub Controls:

1. Delta Commercial
2. Kohler
3. Symmons
4. Powers
5. Moen Commercial

H. Shower/Tub Enclosure:

1. Aquatic Bath
2. Fiber-Fab
3. Maax

I. Faucets:

1. Chicago
2. Delta Commercial
3. Kohler
4. Symmons
5. Moen Commercial

J. Sensor Operated Flush Valves:

1. Sloan
2. Zurn

K. Sensor Operated Faucets:

1. Sloan
2. Chicago
3. Delta Commercial
4. Moen Commercial

L. Other Manufacturers: Submit substitution request.

2.2 FIXTURE TRIM

A. Supply Stops: Chicago cast brass rigid riser supplies with loose key angle stops, wall flanges, NPT female inlet, chrome plate finish; equivalent NPT McGuire (LK series), Brasscraft (SCR series), or NPT stops by fixture supplier.

B. Traps:

1. For floor drains, provide coated cast iron P-trap; recessed, screw jointed or bell and spigot.

2. For other fixtures, provide 17 gauge, chrome plated cast brass P-Traps with solder bushings, and clean-out.

2.3 PLUMBING FIXTURES

A. WC-1 Water Closet:

1. Zurn Z5615-BWL, vitreous china, wall hung, elongated bowl, siphon jet action, 1-1/2-inch top spud, white color finish.

2. Complete with Zurn ZER6000AV-ONE-CPM battery operated flush valve with dual seal diaphragm. (1.1 GPF).

3. Bemis 1600 series white open-front seat, less cover with external check hinge including 300 series stainless steel post and pintles to stop seat at 11 degrees beyond vertical.

4. J.R. Smith Series 200 chair carrier.

B. WC-2 Water Closet (ADA): Same at WC-1, except mounted at ADA mounting height.

C. U-1 Urinal:

1. American Standard Washbrook Flowise, vitreous china, wall mounted wash down urinal with 3/4-inch top spud, white color finish.

2. Complete with American Standard Selectronic battery powered flush valve with self-cleaning piston. (0.125 GPF)

D. L-1 Lavatory (Commercial - ADA):

1. Kohler Soho K-2084-L 20-1/2-inch by 18-1/4-inch, vitreous china, self-draining deck, single mount, wall hung, concealed arm support, grid drain, white color finish.

2. Sloan SF-2150-4 faucet with polished chrome plated solid brass body construction, 4-inch spout, 0.35 GPM, filtered solenoid valve with serviceable filter, vandal resistant complete.

3. J.R. Smith series 800 wall plate.

E. SH-1 Shower (with enclosure - ADA Adaptable):

1. Delta TEK Series shower valve assembly with polished chrome finish, pressure balance mixing valve, high temperature limit stop, integral in-line check valves, lever handle, shower arm and flange and R10000 series rough in kit, less shower head.

2. Niagara water conservation Bi-Max shower head with chrome finish, dual flow rates 1.0/1.5 GPM and easy grip dial for flow rate selection.

3. Aquatic Bath Freedom series shower enclosure (ADA), gelcoat, two piece shower enclosure, 36-inch by 36-inch inside dimensions, 38-inch wide by 38-inch deep outside dimensions, non-slip floor surface, soap dish, grid strainer, reinforced backing for future grab bars and seat, less seat and grab bars. Freedom model 9 removable threshold.

4. Sioux Chief 827 Series brass body shower drain with stainless steel strainer.

F. EWC-1 Electric Water Cooler (ADA):

1. Elkay EZH20 series dual height wall hung water cooler with bottle filling station

2. Surface mounted

3. Push pad operated bubblers

4. Anti-microbial bubbler guards

5. Bottle Filler:

a. Sensor activated

b. 20 second automatic shut-off

c. 1.1 GPM

6. Water Chiller:

a. 8 GPH, 50 degree F water at 90 degree F ambient and 80 degree F inlet water temperature.

b. 120V, single phase, 5 FLA

7. 3000 gallon water filter

G. RD-1 Roof Drain (Small Area): J.R. Smith1330 Series, 8-1/2-inch low profile diameter dome, cast iron body with combined flashing clamp and gravel stop, no-hub outlet and under deck clamp.

H. OD-1 Overflow Roof Drain (Small Area Overflow): J.R. Smith 1330 Series, 8-1/2-inch low profile diameter dome, 2-inch high solid water dam, cast iron body with combined flashing clamp and gravel stop, no-hub outlet and under deck clamp.

I. FD-1 Floor Drain: J.R. Smith 2005 Series, round nickel bronze vandal resistant grate, cast iron body with flashing collar and adjustable strainer head and no-hub outlet.

PART 3 EXECUTION

3.1 FIXTURE TRIM

A. Provide plumbing fixture trim where applicable on fixtures, including but not limited to supply stops, traps, support rims, flush valve, and vacuum breakers.

B. Provide rough-in and final piping connection to fixtures. Carefully review all construction documents to assure that all fixtures are provided with necessary services for a complete operating system.

C. Rigidly secure rough-in piping, carriers and supports, and other service piping to structure.

3.2 PLUMBING FIXTURES

A. Americans with Disabilities Act:

1. Those fixtures indicated by ADA complies with and be installed in accordance with Americans with Disabilities Act Guidelines (ADAAG). Where applicable building code requirements are more stringent than ADAAG guidelines, building code requirements followed.

2. Water Closets:

a. Mounting height of ADA water closet 17-inches to 19-inches from floor to top of the toilet seat.

b. Mount flush valve for ADA water closets on wide side of enclosure.

3. Lavatories:

a. Mounting height of ADA lavatories at a maximum height of 34 inches from floor to rim.

b. Provide insulation kits on exposed hot water and waste piping beneath ADA lavatories.

4. Urinals: Mounting height of ADA water closet at a maximum height of 17-inches from floor to top rim.

B. Fixture Mounting Heights: Fixtures standard rough-in catalogued heights unless shown otherwise on the Architectural Drawings.

C. Showers:

1. Piping from shower mixing valve to shower head rigid pipe. PEX piping not allowed.

2. Shower Head Mounting Heights: Mount so that face of head is at 6-feet-6-inches above finished floor and not to conflict with shower enclosure.

D. Water Supplies: When both hot and cold water to a fixture is required, connect the hot on the left and the cold on the right.

E. Floor Mounted Supports and Chair Carriers:

1. Secure floor mounted supports and chair carriers to slab with a minimum of 1/2-inch bolts.

2. Install supports and carriers per manufacturer's installation instructions.

F. Lavatories:

1. Public Toilet Room: Grid strainers.

2. Private Toilet Room: Pop-up waste assemblies.

3. Those lavatories indicated as ADA are ADA compatible. Coordinate with Architect to verify if all wall hung lavatories are to be installed at ADA height.

G. Floor Drain and Floor Sinks:

1. Set top flush with finished floor.

2. Provide flashing clamp for all drain bodies installed in floors provided with waterproof membranes.

H. Roof and Area Drains:

1. Provide sump receivers for all drains except poured in place installations.

2. Provide extension section as required to compensate for the specified insulation thickness above the roof slab or deck.

I. Water Coolers and Drinking Fountains:

1. Water-bearing materials comply with the Safe Drinking Water Act of 1986 and the Lead Contamination Control Act of 1988. The waterway system of the unit manufactured of copper components and other completely lead-free materials.

2. Water cooler refrigerants will be non-CFC.

3. Provide fixture manufacturer's wall mounting plate or floor mounted support for all wall-hung water coolers or drinking fountains.

J. Wall hung lavatories with pop-up waste assemblies: Verify there is no vertical pull rod assembly conflict with lavatory backsplash prior to submitting product data.

END OF SECTION

COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. The intent of Division 23, HVAC Specifications and the accompanying Drawings is to provide a complete and workable facility with complete systems as shown, specified and required by applicable codes. Include work specified in Division 23, HVAC and shown on the accompanying Drawings, including appurtenances, connections, etc., in the finished job.

B. The Drawings that accompany the Division 23, HVAC Specifications are diagrammatic. They do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Offsets and transitions assumed at a minimum at each duct crossing, structural penetrations through shear walls or beams, structural grids where ceiling heights are restricted, and at piping mains. Follow the Drawing as closely as is practical to do so and install additional bends, offsets and elbows where required by local conditions from measurements taken at the Building, subject to approval, and without additional cost to the Owner. The right is reserved to make any reasonable changes in outlet location prior to roughing-in, without cost impact.

C. The General and Supplemental Conditions apply to this Division, including but not limited to:

1. Drawings and specifications.

2. Public ordinances, permits.

3. Include payments and fees required by governing authorities for work of this Division.

D. Division 01, General Requirements, General Requirements, applies to this Division.

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Products and equipment prohibited from containing pentabrominated, octabrominated, and decabrominated diphenyl ethers. Where products or equipment within this specification contain these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.

2. General: Work and materials conforms to the local and State codes, and Federal, State and other applicable laws and regulations.

3. Contractor responsible for obtaining and payment for permits, licenses, and inspection certificates required in accordance with provisions of Contract Documents.

B. New materials and equipment. Work of good quality, free of faults and defects and in conformance with the Contract Documents.

C. Apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.

D. The entire mechanical system and apparatus operates at full capacity without objectionable noise or vibration.

E. Install equipment level and true. Housekeeping pads and curbs account for floor or roof slope.

F. Materials and Equipment:

1. Each piece of equipment furnished meet detailed requirements of the Drawings and Specifications and suitable for the installation shown. Equipment not meeting requirements will not be acceptable, even though specified by name along with other manufacturers.

2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer. Component parts of the entire system need not be products of same manufacturer.

3. Furnish materials and equipment of size, make, type, and quality herein specified.

4. Equipment scheduled by performance or model number considered the basis of the design. If other specified manufacturer's equipment is provided in lieu of the basis of design equipment the contractor is responsible for changes and costs which may be necessary to accommodate this equipment, including different sizes and locations for connections, different electrical characteristics, different dimensions, different access requirements, or any other differences which impact the project.

G. Workmanship:

1. General: Install materials in a neat and professional manner.

2. Manufacturer’s Instructions:

a. Follow manufacturer’s directions where they cover points not specifically indicated.

b. If conflict with the Drawings and Division 23, HVAC Specifications, obtain clarification before starting work.

H. Cutting and Patching:

1. Cutting, patching, and repairing for the proper installation and completion of the work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting performed by skilled craftsmen of each respective trade in conformance with the appropriate Division of Work.

2. Additional openings required in building construction made by drilling or cutting. Use of jackhammer is specifically prohibited.

3. Fill holes which are cut oversize so that a tight fit is obtained around the sleeves passing through.

4. Do no pierce beams or columns without permission of Architect and then only as directed.

5. Restore new or existing work cut or damaged to its original condition. Where alterations disturb lawns, paving, walks, etc., surfaces repaired, refinished, and left in condition existing prior to commencement of work.

1.4 SUBMITTALS

A. Shop Drawings:

1. The Contract Drawings indicate the general layout of the piping, ductwork, and various items of equipment. Coordination with other trades and with field conditions will be required. For this purpose, prepare Shop Drawings of piping, ductwork, and equipment installations. Shop Drawings new drawings prepared by Contractor and not reproductions or tracings of Architect's Drawings. Overlay drawings with shop drawings of other trades and check for conflicts. Drawings the same size as Architect's Drawings with title block similar to Contract Drawings and identifying Architect's Drawing number or any reference drawings. Drawings fully dimensioned including both plan and elevation dimensions. Shop drawings cannot be used to make scope changes.

2. Prepare in two-dimensional format.

3. Include but are not limited to:

a. Complete floor plans with sheet metal and HVAC piping to a minimum of 1/8-inch equals 1-foot scale.

b. Sheet metal and HVAC piping of mechanical and fan rooms to a minimum of 1/4-inch equals 1-foot scale.

c. Sections of congested areas to a minimum of 1/4-inch equals 1-foot scale.

d. Controls and Instrumentation: Scale and drawing sizes to suit controls supplier.

e. Fabricated Equipment: Scale and drawing sizes to suit contractor except equipment not less than 1/4-inch equals 1-foot scale.

f. Superplot plans of above ground work with a colored overlay of trades including, but not limited to, HVAC piping, HVAC equipment, plumbing piping and equipment, sprinklers, lighting, lighting controls, cable tray, fire alarm devices, electrical power conduit, and ceiling system to a minimum of 1/2-inch equals 1-foot scale.

4. Submit shop drawings for review prior to beginning fabrication. Additional shop drawings may be requested when it appears that coordination issues are not being resolved in the field or when there is a question as to whether contract documents are being complied with or the design intent is being met.

B. Product Data:

1. In general, submit product data for review on scheduled pieces of equipment, on equipment requiring electrical connections or connections by other trades, and as required by each specification section or by Drawing notes. Include manufacturer's detailed shop drawings, specifications, and data sheets. Data sheets include capacities, RPM, BHP, pressure drop, design and operating pressures, temperatures, and similar data. Manufacturer's abbreviations or codes are not acceptable.

2. List the name of the motor manufacturer and service factor for each piece of equipment.

3. Indicate equipment operating weights including bases and weight distribution at support points.

4. In the case of equipment such as wiring devices, time switches, valves, etc., specified by specific catalog number, a statement of conformance will suffice.

C. Submission Requirements:

1. Shop Drawings and Product Data:

a. Refer to Division 01, General Requirements for additional requirements related to submittals.

b. Submit copies of shop drawings and product data for Work of Division 23, HVAC in a 3-ring loose leaf binder with each item filed under a tab and labeled with its respective specification section number, Article and paragraph, and mark if applicable.

c. Submit electronic copies of shop drawings and product data for Work of Division 23, HVAC in PDF format with each item filed under a folder and labeled with its respective specification section number, Article and paragraph and mark if applicable.

d. Include a complete index in the original submittal. Indicate both original items submitted and note stragglers that will be submitted at a later date to avoid delay in submitting.

e. The bulk of the shop drawings and product data, excepting Controls and Instrumentation, included with the original submittal. Controls and Instrumentation submittals may lag but complete when submitted. Partial submittals will not be accepted. Other stragglers submitted after return of the original binder includes a tab similar to that originally submitted. Upon receipt of the returned late submittal, insert them in the previously submitted binder.

D. Contractor Responsibilities:

1. Submit submittals one time and are in proper order.

2. Ensure that equipment will fit in the space provided.

3. Assure that deviations from Drawings and Specifications are specifically noted in the submittals. Failure to comply will void review automatically.

1.5 AS-BUILT DRAWINGS

A. Record Drawings: Provide hard copies and pdf format.

1. Drawings include the following:

a. Project Specific Titleblock.

b. Notations reflecting the as built conditions of any additions to or variations from the construction documents provided as part of the BIM coordination, RFIs, ASIs, Owner Changes, and Field Coordination.

1.6 OPERATING AND MAINTENANCE MANUAL, PARTS LISTS, AND OWNER'S INSTRUCTIONS

A. Refer to Division 01, General Requirements for additional requirements.

B. Submit three bound copies of manufacturer's operation and maintenance instruction manuals and parts lists for each piece of equipment or item requiring servicing. Literature on 8-1/2-inch by 11-inch sheets or catalogs suitable for side binding. Submit data when the work is substantially complete, packaged separately, and clearly identified in durable 3-ring binder. Include name and contact information for location of source parts and service for each piece of equipment. Clearly mark and label in each submittal, the piece of equipment provided with the proper nameplate and model number identified. Provide wiring diagrams for electrically powered equipment.

C. Instruct Owner thoroughly in proper operation of equipment and systems, in accordance with manufacturer's instruction manuals. Operating instructions cover phases of control.

D. Furnish competent engineer knowledgeable in this building system for minimum of two 8-hour days to instruct Owner in operation and maintenance of systems and equipment. Keep a log of this instruction including dates, times, subjects, and those present and present such log when requested by Architect.

1.7 PROJECT CONDITIONS

A. Existing Conditions:

1. Prior to bidding, verify and become familiar with existing conditions by visiting the site, and include factors which may affect the execution of this Work.

2. Include related costs in the initial bid proposal.

B. Coordinate exact requirements governed by actual job conditions. Check information and report discrepancies before fabricating work. Report changes in time to avoid unnecessary work.

C. Coordinate shutdown and start-up of existing, temporary, and new systems and utilities. Notify Owner, the City, and Utility Company.

1.8 WARRANTY

A. Provide a written guaranty covering the work of this Division (for a period of one calendar year from the date of acceptance by the Owner) as required by the General Conditions.

B. Provide manufacturer's written warranties for material and equipment furnished under this Division insuring parts and labor for a period of one year from the date of Owner acceptance of Work of this Division.

C. Correct warranty items promptly upon notification.

1.9 PROVISIONS FOR LARGE EQUIPMENT

A. Make provisions for the necessary openings in building to allow for admittance of equipment.

1.10 TEST REPORTS AND CERTIFICATES

A. Submit one copy of test reports and certificates specified herein to the Architect.

1.11 SUBSTITUTIONS

A. Submit requests for product substitutions in accordance with the Instructions to Bidders and the General and Supplemental Conditions.

PART 2 PRODUCTS

2.1 ACCESS PANELS

A. Furnish under this Division as specified in another Division of work.

2.2 PIPE AND DUCT SLEEVES

A. Interior Wall and Floor Sleeves: 18 gauge galvanized steel, or another pre-approved system.

B. Interior Wall and Floor Sleeves (fire rated): Fire rated and water tight system approved by Authority Having Jurisdiction and Owners Insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping material, size and service.

C. Exterior Wall Sleeves: Cast iron

D. On Grade Floor Sleeves: Same as exterior wall sleeves.

E. Water Tight Sleeves: Combination steel pipe sleeves with water stop and anchor plate; Link Seal Model WS, mated with synthetic rubber links interlocked with bolts and nuts; Link Seal Model LS.

2.3 FLOOR, WALL AND CEILING PLATES

A. Furnish stamped split type plates as follows:

1. Floor Plates: Cast brass, chromium plated.

2. Wall and Ceiling Plates: Spun aluminum.

2.4 MACHINERY GUARDS

A. Furnish guards for protection on rotating and moving parts of equipment. Provide guards for metal fan drives and motor pulleys, regardless of being enclosed in a metal cabinet.

B. Design guards so as not to restrict air flow at fan inlets resulting in reduced capacity.

C. Provide shaft holes in guards for easy use of tachometers at pulley centers. Guards easily removable for pulley adjustment or removal and changing of belts.

D. Guards meet OSHA requirements including back plates.

E. Provide inlet and outlet screens on fans in plenums or where exposed to personnel.

2.5 ELECTRICAL EQUIPMENT

A. General: Equipment and installed work as specified under Division 26, Electrical.

B. Coordinate with the electrical Drawings and electrical contractor for minimum electrical equipment bracing requirements based on the available fault current rating at the bus of the panelboard or switchboard serving the piece of equipment. Provide equipment with a Short Circuit Current Rating (SCCR) that meets the bracing requirement.

C. Motors – AC Induction:

1. Furnish as integral part of driven equipment.

2. Drip proof induction type with ball bearings unless noted otherwise.

3. Motors 1 hp and above premium energy efficient type, except for emergency equipment motors.

4. Built to NEMA Standards for the service intended.

5. Rated for voltage specified, suitable for operation within the range of 10 percent above to 10 percent below the specified voltage.

6. Energy Efficient Motors:

a. Baldor

b. Westinghouse

c. General Electric

d. Or approved equal.

7. Motors meet the efficiency standards identified in the table below as determined using the IEEE Method B test at full load.

MINIMUM MOTOR EFFICIENCIES					
		RPM IEEE 112B Efficiency			
HP	KW	900	1200	1800	3600
1	0.75	--	82.5	85.5	80.0
1.5	1.15	--	86.5	86.5	85.5
2	1.53	--	87.5	86.5	86.5
3	2.3	84.0	89.5	89.5	88.5
5	3.8	85.5	89.5	89.5	89.5
7.5	5.6	87.5	91.7	91.7	91.0
10	7.5	88.5	91.7	91.7	91.7
15	7.5	88.5	91.7	92.4	91.7
20	15.9	90.2	92.4	93.0	92.4
25	18.8	91.0	93.0	93.6	93.0
30	22.5	91.0	93.6	94.1	93.0
40	30.0	91.7	94.1	94.5	93.6
50	37.5	92.4	94.1	94.5	94.1
60	45.0	93.0	94.5	95.0	94.1
75	56.3	93.0	95.0	95.4	94.5
100	75.0	93.0	95.4	95.4	95.0
125	93.8	94.5	95.4	95.4	95.4
150	112.5	94.5	95.8	95.8	95.4
200	150.0	94.5	95.8	96.2	95.8
250	187.5	94.5	95.1	96.2	95.1
300	225.0	94.5	95.3	96.2	95.3
350	225.0	94.5	95.3	96.2	95.3
400	300.0	94.5	95.4	96.2	95.4
450	337.5	94.5	95.5	96.2	95.5
500	375.0	94.5	95.6	96.2	95.6

8. Refer to Equipment Schedules on the Drawings for motor horsepower, voltage, and phase.

9. Refer to individual product sections for additional motor requirements.

10. Furnish motors on belt drive equipment of nominal nameplate horsepower not less than 120 percent of equipment brake horsepower required for performance specified.

11. Built-in thermal overload protection, or be protected externally with separate thermal overload devices with low voltage release or lockout. Hermetically sealed motors have quick trip devices.

12. Motors controlled by variable frequency drives inverter duty rated and have Class F insulation or better. Withstand repeated voltage peaks of 1600V with rise times of 0.1 microseconds and greater in accordance with NEMA Standard MG1 Part 31.

13. Motors served from variable frequency drives equipped with shaft grounding system which provide a path for current to flow between the shaft and motor frame. SGS or equal.

14. Motors located in environment air plenums not tied to air handling functions totally enclosed type motors.

D. Motors – Electronic Commutation (EC):

1. Furnished as integral part of driven equipment.

2. Permanently lubricated with ball bearings unless noted otherwise.

3. Internal motor circuitry converts AC power supplied to the motor to DC power to operate the motor.

4. Speed controllable down to 20 percent of full speed.

5. Motor efficiency at a minimum of 85 percent at all speeds.

6. Refer to Equipment Schedules on the Drawings for motor horsepower, voltage, and phase.

7. Refer to individual product sections for additional motor requirements.

8. Built-in thermal overload protection, or be protected externally with separate thermal overload devices with low voltage release or lockout. Quick trip devices hermetically sealed motors.

9. Motors located in environment air plenums not tied to air handling functions totally enclosed type motors.

E. Starters: Provided under Division 26, Electrical, suitable for performing the control functions required, with the exception of self-contained equipment and where the starters are furnished as part of the control package.

F. Equipment Wiring:

1. Interconnecting wiring within or on a piece of mechanical equipment provided with the equipment unless shown otherwise.

2. This does not include the wiring of motors, starters and controllers provided under Division 26, Electrical.

G. Control Wiring: Control wiring for mechanical equipment provided under Section 23 09 00, Instrumentation and Controls for HVAC.

H. Codes: Electrical equipment and products bear the UL label as required by governing codes and ordinances.

PART 3 EXECUTION

3.1 ACCESS PANELS

A. Install in accord with manufacturer's recommendations, coordinated with architectural features.

B. Provide 2-hour fire rated doors where required bearing the UL label.

C. Furnish 18-inch by 18-inch panels for ceilings and for access to equipment in soffits and shafts, and 12-inch by 12-inch for walls unless indicated otherwise.

D. Furnish where indicated and where required to access valves, fire/smoke dampers, trap primers, shock arresters, and other appurtenances requiring operation, service or maintenance. Submit proposed locations for review prior to installation.

3.2 SLEEVES

A. Interior Floor and Wall Sleeves:

1. Provide sleeves large enough to provide 3/4-inch clearances around pipe or ductwork.

2. Where pipe or ductwork is insulated, insulation passes continuously through sleeve with 3/4-inch clearance between insulation and sleeve.

3. Penetrations through mechanical room and fan room floors watertight by packing with safing insulation and sealing with Tremco Dymeric Sealant or approved system.

B. Sleeves through Rated Floors and Walls: Similar to interior sleeves except install fire rated system approved by Authority Having Jurisdiction and Owners insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping or duct material, size and service.

C. Sleeves specified or indicated at fire damper penetrations take precedence over this article.

D. Layout work prior to concrete forming. Do cutting and patching required. Reinforce sleeves to prevent collapse during forming and pouring.

E. Floor sleeves maintain a water barrier by providing a water tight seal or they extend 1-inch above finished floor except through mechanical equipment room floors and shafts where sleeves extend 2-inches above finished floor level. Sleeves through roof extend 8-inches above roof. Wall sleeves flush with face of wall unless otherwise indicated.

F. Do not support pipes by resting pipe clamps on floor sleeves. Supplementary members provided so pipes are floor supported.

G. Special sleeves detailed on drawings take precedence over this section.

3.3 CLEANING

A. General: Clean mechanical equipment, piping and ductwork of stampings and markings (except those required by codes), iron cuttings, and other refuse.

B. Painted Surfaces: Clean scratched or marred painted surfaces of rust or other foreign matter and paint with matching color industrial enamel, except as otherwise noted.

C. Additional requirements are specified under specific Sections of this Division.

3.4 EQUIPMENT PROTECTION

A. Keep pipe, ductwork, and conduit openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, conduit, ductwork, equipment, and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore damaged or contaminated fixtures, equipment, or apparatus to original conditions or replace at no cost to the Owner.

B. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.

C. Cover or otherwise suitably protect equipment and materials stored on the job site.

3.5 ACCESSIBILITY

A. General: Locate valves, thermometers, cleanout fittings and other indicating equipment or specialties requiring frequent reading, adjustments, inspection, repairs, and removal or replacement conveniently and accessibly with reference to the finished building.

B. Thermometers and Gauges: Install thermometers and gauges so as to be easily read from the floors, platforms, and walkways.

3.6 FLOOR, WALL, AND CEILING PLATES

A. Install on piping and ductwork passing through finished walls, floors, ceilings, partitions, and plaster furrings. Plates completely cover opening around pipe and duct.

B. Secure wall and ceiling plates to pipe, insulation, or structure.

C. Plates not penetrate insulation vapor barriers.

D. Plates not required in mechanical rooms or unfinished spaces.

3.7 PAINTING

A. General:

1. Coordinate painting of mechanical equipment and items with products and methods in conformance with the appropriate Division of Work, Painting.

2. Exposed work under this Division receives either a factory painted finish or a field prime coat finish, except:

a. Exposed copper piping.

b. Aluminum jacketed outdoor insulated piping.

B. Roof Mounted Equipment:

1. Paint two coats of exterior machinery enamel.

2. Color as selected by Architect.

3. Where factory standard finish is indicated in the equipment specification, it is assumed that the standard finish is painted.

3.8 ADJUSTING AND CLEANING

A. Before operating any equipment or systems, make thorough check to determine that systems have been flushed and cleaned as required and equipment has been properly installed, lubricated, and serviced. Check factory instructions to see that installations have been made accordingly and that recommended lubricants have been used.

B. Use particular care in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Check equipment for damage that may have occurred during shipment, after delivery, or during installation. Repair damaged equipment as approved or replace with new equipment.

3.9 ELECTRICAL EQUIPMENT

A. Ductwork or piping for mechanical systems not serving electrical space not installed in any switchgear room, transformer vault, telephone room, or electric closet except as indicated.

B. Ductwork or piping for mechanical systems not to pass over switchboards or electrical panelboards. Where conflicts exist, bring to attention of Architect.

3.10 EQUIPMENT CONNECTIONS

A. Make final connections to equipment specified in sections other than Division 23, HVAC of the specifications and Owner furnished equipment in accordance with manufacturer’s instructions and shop drawings furnished and as indicated.

B. Piping:

1. Connections include refrigerant condensate.

2. Provide valves and specialties as specified and as detailed on the Drawings. Provide increasers, reducers, and any other fittings required for complete installation.

3. Independently support piping connections supported to prevent undue strain on equipment.

END OF SECTION

VARIABLE FREQUENCY DRIVES FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Variable Frequency Drives

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 09 00, Instrumentation and Controls for HVAC

1.3 SUBMITTALS

A. Submit the following:

1. Product data on variable frequency drives and related components.

2. Startup log/check list showing successful operation.

3. Operation and maintenance data.

1.4 WARRANTIES

A. Provide 24-month warranty from date of shipment to include full replacement covering parts and labor.

PART 2 PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES

A. Manufacturers:

1. Reliance

2. Toshiba

3. ABB

4. Emerson

5. Yaskawa

6. Square D

7. Siemens

8. Saftronics

9. Allen-Bradley

10. Danfoss

11. Cerus

12. Other Manufacturers: Submit substitution request.

B. General Description:

1. Variable Frequency AC Motor Drive (VFD):

a. Pulse width modulated (PWM) inverter type.

b. Designed to convert 60 Hz input power to adjustable frequency output power to provide positive speed control to standard induction motors.

c. Dedicated variable torque design for specific use with centrifugal loads.

2. Provide completely solid state variable frequency power and logic unit.

3. Speed control to be stepless throughout the range under variable torque load on continuous basis. Speed controlled by remote building energy management system providing 4-20MA input signal to drive and remote start/stop signal. Coordinate with Section 23 09 00, Instrumentation.

4. Provide adjustable frequency control with diode bridge/capacity input designed to provide high, constant power factor of 0.95 regardless of load or speed and eliminate SCR line noise.

5. Equipment will be designed and manufactured in accordance with applicable current NEMA and IEEE recommendations and be designed for installation per NEC. Equipment will be UL listed and bear the UL label.

6. Control suitable for operation in ambient temperatures of 32 degrees F to 104 degrees F.

7. Factory tested with an AC induction motor 100 percent loaded and temperature cycled within an environmental chamber at 104 degrees F.

C. Self-Protection and Reliability Features:

1. Adjustable current limit to 60 percent to 110 percent of drive rating.

2. Adjustable instantaneous overcurrent trip.

3. Under voltage trip.

4. Over temperature trip.

5. Short circuit protection phase to phase and phase to ground faults phase rotation insensitive.

6. Momentary power loss, more than 17 milliseconds.

7. Transient protection against normal transients and surges in incoming power line.

8. Orderly shutdown in event of any of above conditions, drive designed to shut down safely without component failure.

9. Provide visual indication and manual reset.

D. Standard Features:

1. Drive Logic: Microprocessor based

2. Control Logic: Isolated from power circuitry.

3. Standalone operation to facilitate start up and troubleshooting procedures.

4. UL 508C listed for drives serving a single motor or UL 508A listed for drives serving multiple motors, for use on distribution systems with 22,000 AIC.

5. Output voltages equal to applied input voltage.

6. Isolated signal inputs.

7. Frequency Stability. Output frequency will be held to +0.1 percent of maximum frequency regardless of load, +10 percent input voltage change or temperature changes within ambient specification.

8. Built-in digital display indicates output frequency, voltage, and current and provide indication of over current, over voltage, current limit, ground fault, over temperature, input power on, minimum or maximum speed adjustment, power on, fault condition. Display on panel face.

9. Start/Stop Control - Controlled decelerated stop.

10. Primary and secondary fused for a control circuit transformer.

11. Minimum and maximum speed control.

12. Adjustable Accel/Decel - independently adjustable 10-100 second.

13. Hand-Off auto switches.

14. Programmable Auto Restart - after power outage.

15. Provide fused disconnect, including auxiliary contacts to isolate control circuit when disconnect is in “off” position, except fused disconnects not required where packaged equipment is provided with a single point connection with single point disconnect and internal overcurrent protection for VFD and motors.

16. Remote contacts for fault, and on/off status.

17. Adjustable motor output voltage.

18. Analog output voltage of 0-10 VDC, -20 MA proportional to control output frequency.

19. Provide a NEMA 1 enclosure for indoor applications and NEMA 3R enclosure for outdoor applications to isolate each motor starter and control section with its associated disconnect switch.

20. Manual speed control for each motor.

21. Provide RF, and EMI, noise suppression network to limit RF and EM interference.

22. Provide isolated analog output signals for volts, amps, and frequency, from each VFD for connection to the building energy management system.

23. Provide line (input) reactors.

24. Provide output filters for VFD's located more than 25 conductor feet from the motor they serve. Output reactors permit VFD's to be located up to 350-feet from the motors they serve.

25. Design VFD to catch spinning load in forward and reverse direction.

26. Harmonic Calculations: Perform on manufacturer supplied Harmonic Analysis program to provide conformance with IEEE 519-1992.

E. Communications:

1. Provide factory installed communication chip for direct network connection to DDC Control System specified in Section 23 09 00, Instrumentation and Controls for HVAC. Interface allows for control and interface functions specified herein and in Section 23 09 00, Instrumentation and Controls for HVAC. Interface control functions and information includes, but not be limited to the following:

   a. Start/Stop

   b. Change Directions

   c. Drive Fault

   d. Drive Fault Codes

   e. Reset Drive

   f. Percent Output

   g. Speed

   h. Power

   i. Drive Temp

   j. KWH

   k. Run Time

2. Provide isolated analog output signals for volts, amps and frequency from each VFD for connection to the DDC Control System specified in Section 23 09 00, Instrumentation and Controls for HVAC.

3. Provide RS485 communications port and programming software capability.

PART 3 EXECUTION

3.1 VARIABLE FREQUENCY DRIVE INSTALLATION

A. Install VFD in accordance with manufacturer's written installation instructions.

B. Install on strut support stand.

C. Provide one drive for each motor as scheduled.

3.2 START UP

A. General: Comply with manufacturer's instructions for startup.

B. Provide under direct supervision of the manufacturer's representative with factory trained personnel.

3.3 FIELD QUALITY CONTROL

A. Prior to installation, manufacturer's representative coordinate variable speed drive control interface with the controls contractor and verify that intended installation (controls, wiring, etc.) complies with the manufacturer's recommendations.

B. Field Test: Except where initial variable speed drive operation clearly shows the performance meets or exceeds the requirements, test to show compliance. Tests performed by the manufacturer's representative in the presence of the Engineer.

END OF SECTION

HANGERS, SUPPORTS, AND ANCHORS FOR HVAC

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

1.2 SUMMARY

A. This Section includes Design-Build work.

B. This Section includes:

1. Supports
2. Anchors
3. Pipe Rollers
4. Insulation Protection Shields
5. Insulation Protection Saddles
6. Building Attachments
7. Roof Mounted Equipment Support
8. Roof Curbs

1.3 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment

D. Section 23 07 00, Insulation for HVAC

E. Section 23 21 13, Pipe and Pipe Fittings HVAC

1.4 QUALITY ASSURANCE

A. Provide pipe and equipment hangers and supports in accordance with the following:

1. Design supports, anchorages, and seismic restraints for equipment, and supports and seismic restraints for conduit, piping, and ductwork when not shown on the Drawings.
2. Hangers, supports and sway braces to be fabricated in accordance with ANSI B31.1 and MSS SP-58 and SP-89.

3. Use components for intended design purpose only. Do not use for rigging or erection purposes.

4. Seismic restraints and anchorages shall resist seismic forces as specified in the state and local code or by the authority having jurisdiction for the seismic zone in which the project is constructed.

5. Connections to structural framing are not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

6. Seismic Restraints:

   a. Shall not introduce stresses in the piping caused by thermal expansion or contraction.

   b. Shall not exceed forces or design limits of the piping per ASME B31.9.

   c. Provide in accordance with the latest edition of the SMACNA, Seismic Restraint Manual Guidelines for Mechanical Systems" for the Seismic Hazard Level corresponding to the seismic zone in which the project is constructed.

   d. Provide in accordance with the local applicable codes.

   e. Follow provisions described in Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

7. Piping Connections to Equipment:

   a. Shall not introduce twisting, torsion, or lateral forces or moments on the equipment.

   b. Shall be supported and isolated in a manner not to exceed the equipment's point of connection load limitations.

B. Engineered Support Systems: Provide design services for the following support systems:

1. Supports and seismic restraints for suspended piping, ductwork, and equipment.

2. Support frames such as pipe racks or stanchions for piping, ductwork, and equipment which provide support from below.

3. Equipment, ductwork, and piping support frame anchorage to supporting slab or structure.

1.5 SUBMITTALS

A. Submit the following:

1. Shop Drawings of contractor fabricated support structures.

2. Structural Details and Calculations:

a. Submit structural details and calculations substantiating that building structure, anchorages, and fabricated steel braces can safely withstand maximum calculated loads.

b. Details and calculations to bear the seal of a professional engineer registered in the state having jurisdiction.

3. No other submittals required under this section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Supports:

1. Unistrut
2. Superstrut
3. Powerstrut
4. Kinline
5. B-Line Systems
6. AnvilStrut

B. Pipe Hangers:

1. Anvil
2. Superstrut
3. B-Line Systems
4. Tolco
5. ERICO
6. Pipe Shields Inc.
7. Rilco

C. Pipe Rollers

1. Anvil
2. Super Strut
3. B-Line Systems

4. Tolco
5. ERICO

D. Insulation Protection Shields

1. Anvil
2. Super Strut
3. B-Line Systems
4. Tolco
5. ERICO

E. Insulation Protection Saddles

1. Anvil
2. Super Strut
3. B-Line Systems
4. Tolco
5. ERICO

F. Pipe Guides

1. Anvil
2. B-Line Systems
3. Pipe Shields Inc.
4. Rilco
5. Hyspan

G. Pipe Anchors

1. Anvil
2. B-Line Systems
3. Pipe Shields Inc.
4. Rilco

H. Building Attachments

1. Anvil

2. Elcen

3. Superstrut

4. B-Line Systems

5. Tolco

6. ERICO

I. Roof Mounted Equipment Support

1. Thybar

2. Greenheck

3. Twin City

J. Roof Curbs

1. Thybar

2. Greenheck

3. Twin City

2.2 SUPPORTS

A. Fabricate support members from welded standard structural shapes, pipe, and plate to carry the necessary rollers, hangers, and accessories as required. Support piping less than 4-inch pipe size from or by prefabricated roll-formed channels with necessary accessories to adequately support piping system.

B. Supports and Accessories: Preformed roll-formed channels and accessories with matching compatible accessories as shown, as specified, and as required.

C. Dissimilar Metal Protection: Hydra-Zorb cushions or Cush-a-strip.

D. Clamps: Super Strut Series 700 through 702 or AnvilStrut Series 1000 through 1200.

2.3 PIPE HANGERS

A. Uninsulated Horizontal Copper Piping:

1. 2-inch and Smaller: Anvil CT-65, CT-69.

2. Larger than 2-inch:

a. Anvil 260 field or factory copper plated, plastic coated or other recognized industry methods.

b. Electricians' tape is unacceptable.

B. Insulated Horizontal Copper Pipe with Hangers Inside of Insulation: Same as Uninsulated Horizontal Copper Pipe.

C. Insulated Horizontal Copper Pipe with Hangers Outside of Insulation:

1. 2-inch and Smaller: Anvil 65, 104 or 260.

2. Larger than 2-inch: Anvil 260.

D. Other Uninsulated Horizontal Pipe:

1. 2-inch and Smaller: Anvil 65, 104 or 260.

2. Larger than 2-inch: Anvil 260.

E. Other Insulated Horizontal Pipe with Hangers Inside of Insulation:

1. 2-inch and Smaller: Anvil 65, 104, 260 or 300.

2. Larger than 2-inch: Anvil 260.

F. Other Insulated Horizontal Pipe with Hangers Outside of Insulation:

1. 2-inch and Smaller: Anvil 65, 104 or 260.

2. Larger than 2-inch: Anvil 260.

G. Riser Clamps Copper Pipe:

1. 4-inch and Smaller: Anvil CT-121, CT-261.

2. Larger than 4-inch: Anvil 261.

H. Riser Clamps Other Piping: Anvil 261.

2.4 PIPE ROLLERS

A. Cast Iron roll and sockets, steel roll rod.

1. Anvil 171, 175, 177, 178, 181, or 274 as required.

2. Size for pipe plus insulation for insulated pipe.

2.5 INSULATION PROTECTION SHIELDS

A. Galvanized carbon steel.

1. Anvil 167.

2.6 INSULATION PROTECTION SADDLES

A. Carbon steel.

1. Anvil 160 series.

2. Saddles for copper pipe: Factory copper plated.

2.7 PIPE GUIDES

A. Spider type alignment guide.

1. Anvil 255, 256, 257 & 436

2. Steel Piping:

a. Carbon steel housing

b. Carbon steel spider clamp

3. Copper Piping:

a. Carbon steel housing

b. Factory copper plated steel spider clamp

2.8 PIPE ANCHORS

A. Uninsulated Pipe

1. Pipe Shields Inc. C1000

B. Insulated Pipe

1. Pipe Shields Inc. C3000 through C4300 series

C. Pipe Stanchions

1. Anvil 62

2.9 BUILDING ATTACHMENTS

A. Beam Hangers:

1. On piping 6-inch and smaller: Anvil 86 with retaining clip Fig. 89.

2. On piping larger than 6-inch: Anvil 228, or 292.

B. Inserts:

1. Anvil 152 malleable iron or 281 steel inserts.

2. Inserts sized for required rod to support load being carried.

C. Expansion Plugs: Similar and equal to Phillips “red-head” self-drilling flush shell selected for safety factor of 4.

D. Powder actuated fasteners with silencers as approved by Architect.

2.10 ROOF MOUNTED EQUIPMENT SUPPORT

A. Continuous welded aluminum or galvanized steel construction.

B. Pressure treated wood nailer strip mechanically fastened with corrosion resistant fasteners.

C. Engineered to support gravity and seismic loads of equipment.

D. Suitable for use on insulated or non-insulated roof decks.

E. Account for roof slope and roof insulation thickness to provide level mounting service for equipment.

F. Curb height no less than 8 inches from roof membrane.

2.11 ROOF CURBS

A. Continuous welded aluminum or galvanized steel construction.

B. Pressure treated wood nailer strip mechanically fastened with corrosion resistant fasteners.

C. Engineered to support gravity and seismic loads of entire unit.

D. Suitable for use on insulated or non-insulated roof decks.

E. Account for roof slope and roof insulation thickness to provide level mounting service for equipment.

F. Curb height no less than 8 inches from roof membrane.

G. Provide minimum 1-1/2 inch thick 3 pounds per cubic foot density rigid fiberglass insulation with encapsulated top and bottom.

H. Spring isolated roof curbs where fans and compressors are not internally isolated.

I. Seismic/wind restraint brackets.

PART 3 EXECUTION

3.1 HANGERS AND SUPPORTS

A. General:

1. Install support systems as detailed and in accordance with manufacturer’s recommendations. Provide pipe racks, pipe stands, trapeze hangers, etc., as required, and as detailed on the Drawings.

2. Provide adjustable hangers for pipes complete with inserts, adjusters, bolts, nuts, swivels, all-thread rods, etc., except where specified otherwise.

3. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping and do not support piping from other piping.

4. Except as otherwise indicated for exposed continuous pipe runs, install hangers, and supports of same type and style as installed for adjacent similar piping.

5. Support piping within 2-feet of each change of direction on both sides of fitting.

B. Insulated Piping Systems:

1. Refer to Section 23 07 00, Insulation for HVAC for insulation requirements.

2. Insulated Piping Systems with Vapor Barrier Insulation:

a. Install hangers outside of insulation.

b. On piping 1-1/2-inch and larger, provide insulation protection shields at each support location.

3. Other insulated Piping Systems with Non-Vapor Barrier Insulation:

a. As specified for Insulated Piping Systems with Vapor Barrier Insulation.

4. Insulation Protection:

a. Band insulation protection shields firmly to insulation to prevent slippage.

b. Tack weld insulation protection saddles to steel pipe. Braze saddles to copper pipe.

C. Vertical Piping:

1. Support Spacing: Provide support at minimum spacing in accordance with state and local codes.

2. Support with U-clamps fastened to wall to hold piping away from wall unless otherwise approved.

3. Provide mid-story vertical guide support where floor to floor distances exceed spacing as required by state and local codes. Riser clamps on steel pipe to be directly welded to pipe. Riser clamps on copper pipe to be installed directly under fitting.

4. Risers that are not subject to thermal change to be supported at each floor of penetration.

5. Risers that are subject to thermal change require engineered supports. Size supports to carry forces exerted by piping system when in operation. Riser supports follow the provisions described in Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

D. Horizontal Piping:

1. Trapeze Hangers:

a. Multiple pipe runs where indicated supported on channels with rust resistant finish.

b. Provide necessary rods and supporting steel.

2. Support Spacing:

a. Provide support at maximum spacing in accordance with state and local codes and any applicable manufacturer requirements.

b. Support piping within 2-feet of each change in direction.

c. Provide piping with acoustical lagging wrap supported a maximum of 5-feet on center. Install hangers outside of acoustical lagging.

E. Building Attachments:

1. Fastening or attaching to steel deck (without concrete fill) is prohibited. It will be necessary to support piping from structural members, beams, joists, or provide intermediate angle iron supporting members between joists. Supports may be attached to concrete filled steel deck with load limitations shown on the structural drawings or otherwise obtained from the structural engineer.

2. Provide horizontal bracing on horizontal runs 1-1/2-inch and larger and exceeding 50-feet in length at 75-foot intervals and as required to provide stabilized piping systems.

3. Provide additional structural steel angles, channels, or other members required to support piping where structures do not occur as required for proper support.

4. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.

F. Roof Mounted Equipment Supports:

1. Select appropriate model for insulated or uninsulated roof deck.

2. Install per manufacturer’s instructions.

3. Account for roof slope to provide level mounting service for equipment.

G. Roof Curbs:

1. Select appropriate model for insulated or uninsulated roof deck.

2. Install per manufacturer’s instructions.

3. Account for roof slope to provide level mounting service for equipment.

4. Coordinate dimensions with installed HVAC unit.

END OF SECTION

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

1.2 SUMMARY

A. This Section includes:

1. Base with Springs
2. Isolating Spring Hangers
3. Rooftop Air Handling Unit Isolation Curb
4. Seismic Restraints

B. Isolation of mechanical equipment as indicated on the Drawings and specified herein.

C. Seismic restraint of equipment, piping, and ductwork.

1.3 RELATED SECTIONS:

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 05 18, HVAC Expansion Compensation

D. Section 23 05 29, Hangers, Supports and Anchors for HVAC

E. Section 23 31 01, HVAC Ducts and Casing-Low Pressure

F. Section 23 31 02, HVAC Ducts and Casing-Medium Pressure

1.4 QUALITY ASSURANCE

A. Single manufacturer select and furnish isolation required, except packaged equipment with integral isolators meeting all the isolation and seismic requirements of this Specification.

B. System of vibration isolators and seismic controls designed, detailed, and bear the seal of a professional engineer registered in the State having jurisdiction.

C. Isolation performance requirements are indicated in the specifications. Deflections indicated are nominal static deflections for specific equipment supported.

D. Isolator Stability and Rated Capacity:

1. Spring diameters not less than 0.8 of the compressed height of the spring at rated load.

2. Springs have a minimum additional travel to solid equal to 50 percent of the rated deflection.

E. Seismic Restraints:

1. Restraint of equipment, piping, and ductwork to be in accordance with the current state and local Building Code.

2. Calculations in accordance with current state and local Building Code.

1.5 SUBMITTALS

A. Submit the following:

1. Submit Shop Drawings showing complete details of construction for steel and concrete bases including:

a. Equipment mounting holes.

b. Dimensions

c. Isolation selected for each support point.

d. Details of mounting brackets for isolator.

e. Weight distribution for each isolator.

f. Code number assigned to each isolator.

2. Submit product data and calculation sheets for isolators, showing:

a. Size, type, load rating, and rated deflection of each required isolator.

b. Percent of vibration transmitted based on the lowest disturbing frequency of the equipment.

3. Structural Details and Calculations substantiating that building structure, anchorages, and fabricated steel braces can safely withstand maximum calculated loads stamped and signed by a registered structural engineer.

4. Installation report as specified in PART 3 of this Section.

5. Operation and maintenance data.

1.6 EQUIPMENT VIBRATION ISOLATION

A. Provide a balanced set of vibration isolators for each piece of equipment listed in the Equipment Schedules.

B. Isolation work to include, but not necessarily be limited to, the following:

1. Isolation support of motor-driven equipment.

2. Inertia base frames in conjunction with isolation.

3. Isolation support of air-handling housings.

4. Isolation support of piping, piping risers, and ductwork.

5. Penetration isolation of pipework, ductwork, and conduits through walls, floors, or ceilings.

6. Flexible connections of ductwork and piping to equipment.

C. Each piece of rotating equipment must meet a reasonable criterion for maximum vibration levels at each bearing, while in operation. The criteria for varying operating speeds are given as follows:

1. Rotating equipment operating at peak vibration velocities must not exceed 0.08-inch/second.

2. If it is discovered that the operating vibration velocities exceed this criteria, the equipment repaired or replaced at no expense to the owner until approval of the equipment is given by the Engineer.

D. Provide components or materials not specially mentioned herein, but necessary to the proper vibration isolation of the equipment.

1.7 CONTRACTOR RESPONSIBILITY

A. Vibration isolation devices, including auxiliary steel bases and pouring forms, design and furnish by a single manufacturer or supplier.

B. Adequately restrain all equipment, piping, and ductwork to resist seismic forces. Design and select restraint devices to meet seismic requirements as defined in the latest issue of the International Building Code under Earthquake Loads and applicable state and local codes.

C. Have the following responsibilities:

1. Selection, installation, adjustment, and performance of vibration isolators which will meet the requirements given on the plans or in the Specifications.

2. Provide Engineering drawings, details, supervision, and instruction to assure proper installation and performance.

3. Provide whatever assistance necessary to ensure correct installation and adjustment of the isolators.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Type 5 – Base with Springs:

1. Mason WFSL
2. Kinetics Noise Control
3. Vibrex

B. Type 7 – Isolating Spring Hangers:

1. Mason 30N, similar Amber-Booth
2. Kinetics Noise Control
3. Vibrex

C. Type 9 – Rooftop Air Handling Unit Isolation Curb:

1. Mason RSC, similar Amber-Booth
2. Kinetics Noise Control
3. Vibrex

2.2 TYPE 5 - BASE WITH SPRINGS

A. Steel base with wide flange beams and springs.

B. Provide minimum clearance of 1-inch.

C. Depth of base equal to 10 percent of the span between supports, 6-inch minimum.

D. Provide external height saving brackets.

2.3 TYPE 7 - ISOLATING SPRING HANGERS

A. Combination rubber-in shear and steel spring isolators installed on the hanger rods.

B. Isolators shall have the proper deflection to allow the piping to deflect as a unit with the equipment isolators.

C. Neoprene element and the cup shall have neoprene bushing bushings projecting through the steel box.

D. Hangers designed for 30 degree angular movement.

E. Minimum Deflection: 1-inch

2.4 TYPE 9 – ROOFTOP AIR HANDLING UNIT ISOLATION CURB

A. Rooftop unit spring isolation curb.

B. Provide minimum deflection of 2-inches.

C. Steel springs shall be laterally stable and rest on 1/4-inch thick neoprene acoustical pads.

D. Hardware shall be plated and the springs provided with a rust resistance finish.

E. Curb waterproofing shall consist of a continuous flexible flashing attached over the lower curb waterproofing.

F. All spring locations shall have accessibility to adjust springs.

G. Curb provides continuous support for equipment and be constructed to resiliently resist wind and seismic forces.

H. Construction of curb must not enable rigid connection between vibrating equipment and building structure.

I. Provide provisions for sloped roof, plenum curb, tall curb, and duct openings where required by installation conditions.

2.5 SEISMIC RESTRAINTS

A. General Requirements:

1. Provided for equipment, piping and ductwork, both supported and suspended.

2. Bracing of piping shall be in accordance with state and local code requirements and ASCE 7 Seismic Design Requirements for Nonstructural Components, whichever is most stringent.

3. Bracing of ductwork shall be in accordance with the state and local code requirements, ASCE 7 Seismic Design Requirements for Nonstructural Components, and with the provisions set forth in the SMACNA seismic restraint manual.

4. The structural requirements for the restraints, including their attachment to the building structure, shall be reviewed and approved by the Structural Engineer.

5. Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.

B. Supported Equipment:

1. All-directional Seismic Rubbers: Interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene.

2. Replaceable bushing and minimum of 1/4-inch thick. Rated loadings not to exceed 1000 psi.

3. 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.

4. Snubber End Caps:

   a. Removable to allow inspection of internal clearances.

   b. Rotated neoprene bushings be rotated to ensure no short circuits exist before systems are activated.

5. Snubber: Mason Industries, Inc. Type Z-1225

C. Bracing of Pipes:

1. Provide seismic bracing of piping as detailed below to meet the building code requirements:

   a. Exception: Piping suspended by individual hangers need not be braced where the following criteria are met.

      (1) Distance between the top of the pipe to the bottom of the support structure is 12-inches or less.

      (2) Seismic braces are not required on high deformability piping when the Ip=1.0 and provisions are made to avoid impact with larger pipe or mechanical components or to protect the pipe in the event of such impact and the nominal pipe size is 3-inch diameter or less.

      (3) Seismic braces are not required on high deformability piping when the Ip=1.5 and provisions are made to avoid impact with larger pipe or mechanical components or to protect the pipe in the event of such impact and the nominal pipe size is 1-inch diameter or less.

2. Seismic braces for pipes on trapeze hangers may be used.

3. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints, or where pipes connect to equipment.

4. Cast iron pipe of all types, glass pipe, and any other pipe joined with a shield and clamp assembly, where the top of the pipe is 12-inches or more from the supporting structure, shall be braced on each side of a change in direction of 90 degrees or more. Riser joints on unsupported sections of piping shall be braced or stabilized between floors.

5. Vertical risers shall be laterally supported with a riser clamp at each floor. For buildings greater than six stories high or for piping subject to thermal change all risers shall be engineered individually.

D. Bracing of Ductwork:

1. 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.

2. 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.

3. 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.

4. 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.

5. Install duct flex connections at equipment connections to accept expected differential displacement and protect the equipment connection from damage.

E. Suspended Equipment and Piping and Ductwork:

1. 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.

2. 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.

3. 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.

4. Steel angles or strut, 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 UCC as manufactured by Mason Industries, Inc.

5. 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

3.1 GENERAL

A. Do not install any equipment or pipe which makes rigid contact with the building.

B. The installation or use of vibration isolators must not cause any change of position of equipment or piping which would result in stresses in piping connections or misalignment of shafts or bearings. In order to meet this objective, equipment and piping shall be maintained in a rigid position during installation. The load shall not be transferred to the isolator until the installation is complete and under full operational load.

C. Correct, at no additional cost, all installations which are defective in workmanship or materials.

3.2 PREPARATION

A. Treat all isolators, including springs, hardware, and housing, with a corrosion protective coating of epoxy powder or electro galvanizing.

B. Coat steel frames exposed to weather with a rustproof metal primer.

C. Provide hot dipped galvanizing on steel frames as indicated on the plans for corrosion protection in severe conditions.

3.3 INSTALLATION

A. General:

1. Install isolation where indicated on the Drawings by type and location and where indicated below.

2. The assigned code number shall be marked on the isolators and bases to assure placement in the proper location.

3. Anchor isolator seismic housing baseplate to floor.

4. Rubber grommets and washers shall be provided to isolate the bolt from the building structure. Under no circumstances shall the isolation efficiency be destroyed when bolting the isolators to the building structure.

B. Type 5 – Base with Springs:

1. Service:

a. Air Cooled Condensing Unit

C. Type 7 – Isolating Spring Hangers:

1. Service:

a. Fan Coil Units

b. Split-System Air Conditioning Unit

c. Split-System Heat Pump

D. Type 9 – Rooftop Air Handling Unit Isolation Curb:

1. Service:

a. Rooftop Mounted Air Handling Units

3.4 SEISMIC RESTRAINTS

A. General:

1. Install and adjust seismic restraints so that the equipment, piping, and ductwork support is not degraded by the restraints.

2. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.

B. Supported Equipment:

1. Each vibration isolation frame for supported equipment shall have a minimum of four seismic snubbers mounted as close as possible to the vibration isolators and/or the frame extremities.

2. Care must be taken so that the 1/4-inch air gap in the seismic restraint snubber is preserved on all sides in order that the vibration isolation potential of the isolator is not compromised. This requires that the final snubber adjustment be completed after the vibration isolators are properly installed and the installation approved.

C. Bracing of Pipes:

1. Branch lines may not be used to brace main lines.

2. Transverse bracing shall be at 40-feet maximum, except where a lesser spacing is indicated in the SMACNA Seismic Restraint Manual for bracing of pipes.

3. Longitudinal bracing shall be at 80-feet maximum except where a lesser spacing is indicated in the tables. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity to resist both the seismic load and the additional force induced by expansion and contraction.

4. Fuel oil, gas, cast iron pipe of all types, glass pipe and any other pipes joined with four band shield and clamp assembly shall be braced at 1/2 the spacings shown above.

5. A rigid piping system shall not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.

6. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24-inches of the elbow or tee.

7. Branch lines may not be used to restrain main lines.

8. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.

9. Subject to confirmation by field inspection, seismic bracing is not required on piping when the piping is supported by rod hangers and the hangers in the entire run are 12-inches or less in length from the top of the pipe to the supporting structure, hangers are detailed to avoid bending of the hangers and their attachments and provisions are made for piping to accommodate expected deflections.

D. Bracing of Ductwork:

1. Transverse restraints shall occur at 30-foot intervals or at both ends of the duct run if less than the specified interval. Transverse restraints shall be installed at each duct turn and at each end of a duct run.

2. Longitudinal restraints shall occur at 60-foot intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4-feet of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.

3. Hanger straps must be positively attached to the duct within 2-inches of the top of the duct with a minimum of two number 10 sheet metal screws.

4. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.

5. Walls, including gypsum board nonbearing partitions, which have ducts running through them, may replace a typical transverse brace. Provide solid blocking around duct penetrations at stud wall construction.

6. Unbraced ducts shall be installed with a 6-inch minimum clearance to vertical ceiling hanger wires.

E. Suspended Equipment, Piping, and Ductwork Cable Method:

1. The cables shall be adjusted to a degree of slackness approved by the Structural Engineer.

2. The uplift and downward restraint nuts and Mason type RW neoprene covered steel rebound washers for the Type 6 hangers adjusted so there is a maximum 1/4-inch clearance.

3. C-clamps for attachment to the bottom of I-beams must incorporate a restraining strap.

3.5 FIELD QUALITY CONTROL

A. Installation Report: Isolation manufacturer's representative shall confirm that all isolation is installed correctly and submit report stating that isolators are installed as shown on Shop Drawings, isolators are free to work properly, and that installed deflections are as scheduled and as specified.

END OF SECTION

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Piping Markers
2. Equipment Identification
3. Concealed Equipment Identification

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

1.3 SUBMITTALS

A. Submit the following:

1. Valve Tag Directory: Submit for approval prior to fabrication of valve tags.
2. Equipment Nameplate Directory: Submit for approval prior to fabrication.
3. Operating and Maintenance Data: Include a copy of valve tag and equipment nameplate directories in each set of Operating and Maintenance manuals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Piping Markers:

1. W.H. Brady
2. Seton
3. Marking Systems, Inc. (MSI)
4. Other Manufacturers: Submit substitution request.

B. Concealed Equipment Identification:

1. W.H. Brady
2. Seton
3. Other Manufacturers: Submit substitution request.

2.2

2.4 PIPING MARKERS

A. Label pipes with all-vinyl, self-sticking labels or letters.

B. For pipe covering sizes up to and including 3/4-inch outside diameter, select labels with 1/2-inch letters.

C. For sizes from 3/4 to 2-inch outside diameter, 3/4-inch letters, above 2-inches outside diameter, 2-inch letters.

D. Identify pipe markers and color coded as follows with black directional arrows.

HVAC SERVICE	PIPE MARKER *	BACKGROUND COLOR
REFRIGERANT SUCTION	REFRIGERANT SUCTION	YELLOW
REFRIGERANT LIQUID	REFRIGERANT LIQUID	GREEN
REFRIGERANT HOT GAS	REFRIGERANT HOT GAS	YELLOW
* Directional arrow applied adjacent to pipe marker indicating direction of flow.		

2.5 EQUIPMENT IDENTIFICATION

A. Nameplates:

1. Tag air handling supply units, fans, terminal units, and miscellaneous items of mechanical equipment with engraved nameplates.

2. 1/16-inch thick, 3-inch by 5-inch laminated 3-ply plastic, center ply white, outer ply black. Form letters by exposing center ply.

3. Identify unit with equipment tag as shown on Drawings and area served.

4. Label constructed from same material as equipment nameplates.

B. Equipment Nameplate Directory:

1. Air Handlers

2. Terminal Units

3. Other Equipment Nameplates

C. Include Owner and Contractor furnished equipment.

D. List the following on the nameplate:

1. Designation

2. Model Number

3. Location of Equipment

4. Area Served or Function

5. Disconnect Location

6. Normal Position of HOA Switch

2.6 CONCEALED EQUIPMENT IDENTIFICATION

A. Adhesive Laminated Tape:

1. 3/4 width transparent clear tape with black lettering.

2. Lettering in all caps Helvetica font 24 point.

PART 3 EXECUTION

3.1 PIPING MARKERS

A. Unless recommendations of ANSI A13.1, 1981 are more stringent, apply labels or letters after completion of pipe cleaning, insulation, painting, or other similar work, as follows:

1. Every 20-feet along continuous exposed lines.

2. Every 10-feet along continuous concealed lines.

3. Adjacent to each valve and stub out for future.

4. Where pipe passes through a wall, into and out of concealed spaces.

5. On each riser.

6. On each leg of a T.

7. Locate conspicuously where visible.

B. Apply labels or letters to lower quarters of the pipe on horizontal runs where view is not obstructed or on the upper quarters when pipe is normally viewed from above.

C. Apply arrow labels indicating direction of flow.

D. Arrows the same color and sizes as identification labels.

3.2 EQUIPMENT IDENTIFICATION

A. Nameplates: Attach to prominent area of equipment, either with sheet metal screws, brass chain, or contact cement as applicable.

B. Nameplate Directory: Post final copy in Operation and Maintenance Manual.

3.3 CONCEALED EQUIPMENT IDENTIFICATION

A. Where valves or equipment are located above ceilings or behind walls provide adhesive tape indicating the item (valve tag, equipment tag, etc.) at the access location (T-bar ceiling grid, access door, etc.).

B. Applicable equipment includes, but is not limited to, the following:

1. Terminal Units
2. Fan Coil Units
3. Fans

END OF SECTION

PRESSURE TESTING FOR HVAC SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Pressure Testing of Piping and Ductwork Systems

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

1.3 QUALITY ASSURANCE

A. Code Compliance: Perform required tests in the presence of the authority having jurisdiction.

B. Owner Witness: Perform tests in the presence of the Owner's representative.

C. Engineer Witness: The Engineer or Engineer's representative reserves the right to observe tests or selected tests to assure compliance with the specifications.

D. Simultaneous Testing: Test observations by the authority having jurisdiction, the Owner's representative, and the Engineer's representative need not occur simultaneously.

1.4 SUBMITTALS

A. Submit the following:

1. Test Reports:

a. Submit certificate of completion, inspection and test by authority having jurisdiction on required piping systems.

b. Submit certificate of test approval by Owner's representative on all systems.

c. For ductwork testing, submit the Test Report.

d. Test report shall contain description of the testing procedure and results, including recommendation for any remedial actions needed.

e. The Engineer's representative will record witnessed tests.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION

3.1 GENERAL

A. Piping:

1. Test prior to concealment, insulation being applied, and connection to equipment, fixtures, or specialties.

2. Conduct tests with all valves but those used to isolate the test section 10 percent closed.

B. Ductwork: Test prior to connection to equipment and before applying insulation.

C. Leaks: Repair all leaks and retest until stipulated results are achieved.

D. Notification:

1. Advise the Architect 72 hours in advance of each test.

2. Failure to so notify will require test to be rescheduled.

E. Testing Equipment: Provide all necessary pumps, gauges, connections, and similar items required to perform the tests.

3.2 TESTING REQUIREMENTS

A. Medium Pressure Ductwork:

1. Test all ductwork systems at 4-inch static pressure, using a Pacific Air Products Port-O-Lab or Rolok, or a McGill Airflow LEAK DETECTIVE testing machine or approved equivalent.

2. All ductwork testing shall be conducted in accordance with latest published version of the SMACNA HVAC Air Duct Leakage Test Manual.

3. Prior to testing verify that all medium pressure ductwork has been sealed to meet the SMACNA Seal Class A. for all joints, seams and at al duct wall penetrations.

4. Medium pressure ductwork leakage shall be less than or meet the requirement of the following SMACNA Leakage Classes:

a. Rectangular Metal – Class 6

b. Round or Flat Oval – Class 3

5. Maximum allowable leakage is defined as Cubic Feet per Minute (CFM) air leakage per 100 square feet SURFACE AREA of duct section tested.

6. Test all medium pressure ductwork.

B. Piping - General: Test all piping as noted below, with no leaks or loss in pressure for time indicated. Repair or replace defective piping until tests are completed successfully:

HVAC Systems	Test Pressure	Test Medium	Test Duration
VRF Systems – R410A	550 psig**	Nitrogen	24 hours
* The outer casing field welds at piping closures shall be field tested for leaks. Pressurize with compressed air at 15 psig and apply a soap solution and check for leaks. ** Or as recommended by equipment manufacturer.			

END OF SECTION

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Testing and Balancing of Air Systems
2. Testing and Balancing of Miscellaneous Mechanical Equipment

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 08 00, Commissioning for HVAC

D. Section 23 09 00, Instrumentation and Controls for HVAC

1.3 QUALITY ASSURANCE

A. Acceptable Testing and Balancing Firms:

1. A.I.R., Inc.
2. Air Balance Specialty, Inc.
3. Neudorfer Engineers, Inc.
4. Northwest Engineering Services
5. Pacific Coast Air Balance
6. Accurate Balancing Agency, Inc.
7. Precision Test and Balance, Inc.

B. Other Firms: Submit substitution requests prior to bid date.

1. Certification: The firm shall be Certified by National Environmental Balancing Bureau (NEBB).

C. Industrial Standards: Testing and Balancing shall conform to NEBB, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), and American National Standards Institute (ANSI) as follows:

1. NEBB: Comply with Procedural Standards for Testing, Adjusting Balancing of Environmental Systems.
2. ASHRAE: Comply with recommendations pertaining to measurements, instruments, and testing, adjusting and balancing.

3. ANSI:

a. S1.4 Specifications for sound level meters.

b. S1.11 Specifications for Octave-Band and Fractional-Octave-Band analog and digital filters.

D. Instrument Certification: Instruments used shall be accurately calibrated and certified within six months of balancing and maintained in good working order.

E. Test Observation: If requested, the tests shall be conducted in the presence of the Architect or the Architect's representative.

F. Pre-Balancing Conference:

1. Prior to starting balancing, general techniques shall be reviewed with the Engineer. This conference must occur prior to measuring existing conditions.

2. Measuring of existing conditions must occur prior to any demolition or new work.

3. The conference will review existing conditions and systems to be affected by the project

1.4 SUBMITTALS

A. Submit the following:

1. Balancing Log – Existing Systems: Submit preliminary report indicating existing conditions prior to making any modifications to existing systems.

a. Include all air and water outlets, actual field measured air and water volume, and percentage of design volumes.

b. Provide drawings identifying location of all outlets.

2. Equipment Data Sheets – Existing Systems: Indicate actual equipment performance, model numbers, bearing and belt data, motor nameplate data, and final balanced motor data.

3. Balancing Log:

a. Include all air and water outlets, actual field measured air and water volume, and percentage of design volumes.

b. Provide drawings identifying location of all outlets.

4. Equipment Data Sheets: Indicate actual equipment performance, model numbers, bearing and belt data, motor nameplate data, and final balanced motor data.

5. Additional Data: Submit additional data as provided by Associated Air Balance Council (AABC) Standard forms.

6. Number of Copies: Submit six copies of the above completed information to the Engineer for review and insertion into the Operating and Maintenance Data.

7. Instrument Certification: When requested, submit certificate of calibration for equipment to be used.

B. Record data on NEBB forms or forms approved by the Architect.

1.5 PROJECT CONDITIONS

A. Where existing systems are to be adjusted, establish flow rates in all branches prior to making any modifications to system. Adjust central equipment as required and restore all unmodified branches and outlets to original condition. Obtain existing system drawings from Owner and become familiar with extent and nature of existing systems.

B. Do not perform final testing, adjusting, and balancing work until heating, ventilating, and air conditioning equipment has been completely installed and operating continuously as required.

C. Conduct air testing and balancing with clean filters in place. Clean strainers, etc., prior to performing hydronic testing and balancing.

1.6 WARRANTIES

A. In addition to the Requirements of the Contract, include an extended warranty of six months after completion of test and balance work during which time the Architect at his discretion may request a recheck or resetting of any equipment or device listed in the test reports.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Balance to maximum measured flow. Deviation from specified values of ±10 percent at terminal device and ±5 percent at equipment, or mean sound level deviation of 15 decibels. Advise Engineer if deficiencies are generally noted to enable proper corrective actions.

3.2 AIR SYSTEMS

A. General: Make measurements in accord with Industrial Standards specified above. Record on appropriate forms.

B. Preliminary:

1. Identify and list size, type, and manufacture of all equipment to be tested including air outlets and inlets.

2. Use manufacturer’s ratings for equipment to make required calculations except where field test shows ratings to be impractical.

C. Central System:

1. Set speed to provide air volume at farthest run without excess static pressure. Provide additional sheaves and belts as required to accomplish speed adjustment.

2. Read and adjust air supply, return, and exhaust fan units to deliver design conditions at minimum OSA and at 100 percent OSA.

3. Adjust automatic dampers, outside air, return air, and exhaust dampers for design conditions.

4. Read static air pressure conditions on all air handling equipment including filter and coil pressure drops and total pressure across the fan. A Dwyer Series 400 air velocity meter only shall be used for final static pressures at equipment and where critical readings are required.

5. Measure temperature conditions across all outside air, return air, and exhaust dampers to check leakage.

6. Read and record motor data and amperage draw.

7. For variable volume systems, establish minimum static pressure required at sensing point to permit operation over entire VAV range. Adjust supply and return fan speed so that at maximum demand the associated VFD is controlling the motor of motor nameplate RPM to 100 percent. Adjust return fan speed so that return air volumes track with supply air volume minus exhaust air volume.

D. Distribution:

1. Evaluate all building and room pressure conditions to determine adequate supply and return air conditions. Balance the building to be slightly positive to outdoors.

2. Evaluate all building and room pressure conditions to determine adequate performance of the system to maintain temperatures without draft.

3. Perform multipoint pitot traverses to confirm instrumentation, shaft tightness, fan operation, etc. Pitot traverses shall be performed using a Dwyer Series 400 air velocity meter only with applicable duct probe.

4. Mark balancing dampers.

3.3 AUTOMATIC CONTROL SYSTEM

A. In cooperation with control manufacturer's representative, set and adjust automatically operated devices to achieve required sequence of operations.

B. Testing organization shall verify all controls for proper calibration and list controls requiring adjustment by control system installer.

3.4 COORDINATION

A. Coordinate work with other trades to ensure rapid completion of the project.

B. Deficiencies noted during the course of air balancing in the mechanical installation shall be promptly reported to the Architect to allow corrective action to proceed.

C. Periodic review of progress shall be provided as requested.

END OF SECTION

INSULATION FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Pipe Insulation
2. Block Insulation
3. Ductwork Blanket Insulation
4. Ductwork Board Insulation
5. Duct Insulation, Internal
6. Duct, Pipe and Terminal Unit Acoustical Wrap
7. Accessories Piping
8. Accessories Ductwork

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 05 29, Hangers, Supports and Anchors for HVAC

D. Section 23 31 01, HVAC Ducts and Casing – Low Pressure

E. Section 23 31 02, HVAC Ducts and Casing – Medium Pressure

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Prohibit insulating products from containing 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.
2. Flame and Smoke Ratings: Installed composite flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by UL 723 or ASTM E84.
3. Energy Codes: Local Building and Energy Codes govern where insulation performance requirements for thickness exceeds thickness specified.

B. Protection:

1. Protect against dirt, water, chemical, or mechanical damage before, during, and after installation.

2. Repair or replace damaged insulation at no additional cost.

C. Source Quality Control:

1. Service: Use insulation specifically manufactured for service specified.

2. Labeling: Insulation labeled or stamped with brand name and number.

3. Insulation and accessories not to provide nutritional or bodily use to fungi, bacteria, insects, rats, mice, or other vermin, not to react corrosively with equipment, piping, or ductwork, and asbestos free.

1.4 SUBMITTALS

A. Submit the following.

1. Product Data: For each type including density, conductivity, thickness, jacket, vapor barrier, and flame spread and smoke developed indices.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Pipe Insulation:

1. Fiberglass:

a. Johns Manville Microlok HP

2. Elastomeric:

a. ArmacellAP Armaflex

b. Rubatex

c. K-Flex

B. Ductwork Blanket Insulation:

1. Fiberglass:

a. Johns Manville Microlite Type 100

2. Semi-Rigid Fiberglass:

a. Johns Manville Micro-Flex

3. Elastomeric:

a. Armacell Armafle

C. Ductwork Board Insulation:

1. Semi-Rigid Fiberglass:

a. Micro-Aire Duct Board Type LP

2. Rigid Fiberglass:

a. Johns Manville Diffuser Board

D. Duct Insulation, Internal:

1. Round Ductwork:

a. CertainTeed

b. Johns Manville

2. Rectangular Ductwork:

a. CertainTeed

b. Johns Manville

c. Knauf

d. Owens Corning

E. Duct, Pipe and Terminal Unit Acoustical Wrap:

1. Kinetics Noise Control model KNM-100ALQ.

2.2 PIPE INSULATION

A. Fiberglass: Split sectional or Snap-On type with 0.23 per-inch maximum thermal conductivity (K-factor) at 75 degrees F mean temperature, 850 degrees F maximum service rating and white, vapor barrier jacket with pressure sensitive closure system.

B. Elastomeric:

1. Expanded closed cell, 0.27 per-inch maximum K-factor at 75 degrees F mean temperature, 220 degrees F maximum service rating with fitting covers and paintable surface.

2. Color:

a. Concealed Locations: Black

b. Exposed Locations: White.

2.3 DUCTWORK BLANKET INSULATION

A. Fiberglass: 1.0 pcf nominal density, 0.25 per-inch maximum K-factor at 75 degrees F mean temperature, 250 degrees F minimum operating temperature limit.

1. Exposed: FSK facing (foil scrim Kraft) or vinyl - white appearance.

2. Concealed with Vapor Barrier: FSK reinforced foil and paper.

3. Concealed without Vapor Barrier: Facing not required.

B. Semi-Rigid Fiberglass: 2.5 pcf nominal density, 0.24 per-inch maximum K-factor, at 75 degrees F mean temperature, 250 degrees F minimum operating temperature limit.

1. Exposed: FSK facing (foil scrim Kraft) or vinyl-white appearance.

2. Concealed with Vapor Barrier: FSK reinforced foil and paper.

3. Concealed without Vapor Barrier: Facing not required.

C. Elastomeric: Expanded closed cell sheets, 0.27 per-inch maximum K-factor at 75 degrees F mean temperature and 220 degrees F minimum operating temperature limit.

2.4 DUCTWORK BOARD INSULATION

A. Semi-Rigid Fiberglass: 0.23 per-inch maximum K-factor at 75 degrees F mean temperature, 250 degrees F minimum operating temperature limit and all-purpose vapor barrier facing with white Kraft paper finish.

B. Rigid Fiberglass: Same as semi-rigid except with 4.0 pcf density and 0.23 per-inch maximum K-factor.

2.5 DUCT INSULATION, INTERNAL

A. Fiberglass Duct Liner.

1. Thermal Conductance: k-0.23 in accordance with ASTM C518 and ASTM C177 at 75 degrees F mean temperature.

2. Maximum Operating Temperature: 250 degrees F as determined by ASTM C 411.

3. Maximum Air Velocity: 6,000 fpm as determined by ASTM C 1071.

4. Fungi Resistance:

a. Does not breed or promote as determined by ASTM C1338.

b. No growth as determined by ASTM G21.

5. Bacteria Resistance: No growth as determined by ASTM G22.

6. Flame-spread index of 25 or less as determined by ASTM E 84 or UL 723.

7. Smoke development index of 50 or less as determined by ASTM E 84 or UL 723.

8. Acoustical Absorption Coefficients:

a. NRC value as tested in accordance with ASTM C423, type A mounting:

(1) 1-inch thickness: Minimum NRC 0.70

(2) 2-inch thickness: Minimum NRC 0.90

2.6 DUCT, PIPE AND TERMINAL UNIT ACOUSTICAL WRAP

A. Barrier:

1. Construct barrier of a 0.10-inch thick mass loaded, limp vinyl sheet bonded to a layer of reinforced aluminum foil on one side.

2. Nominal density of 1 pound per square-foot and minimum STC rating of 28.

3. Minimum thermal conductivity value of 0.29 and a rated service temperature range of -40 degrees F. to 220 degree F.

4. Flame spread index of no more than 10 and a smoke development index of less than 40.

B. Decoulpling Layer:

1. Combination of 1-inch fiberglass batting, non-woven porous scrim-coated glass cloth, quilted together in a matrix of 4-inch diamond stitch pattern, which encapsulates the glass fibers.

C. Composite Material: Fabricated to include a nominal 6-inch wide barrier overlap tab extending beyond the quilted fiber glass to facilitate a leak-tight seal around field joints.

2.7 ACCESSORIES PIPING

A. Adhesives:

1. General: Maximum Flame Spread/Smoke Developed Rating of 25/50, SCAQMD Rule 1168 compliant.

2. Fiberglass: Integral closure system.

3. Calcium Silicate: Benjamin Foster 30-36.

4. Elastomeric: Armacell 520 BLV.

B. Cements:

1. Insulating: Ryder.

2. Heat Transfer: Chemax Tracit-300.

C. Wire Mesh: 1-inch mesh with 20 gauge annealed steel wire.

D. Pipe Fitting Covers: One piece PVC insulated pipe fitting covers. Zeston, Ceel-Co.

E. Grooved Coupling Insulation: One piece PVC insulated fitting cover. Zeston, Ceel-Co.

F. Metal Pipe Jacket: 0.016-inch thick aluminum jacket with formed fitting covers, aluminum snap straps and sealant.

G. Cloth Facing: Presized fiberglass cloth.

H. Tapes: Pressure sensitive, weather resistant, and for temperatures up to 150 degrees F. Zeston Z-tape.

I. Paint: Ultraviolet resistant latex paint with special adherence capabilities to the PVC fitting covers, elastomeric, aluminum facing, Kraft paper, tapes, and adhesives.

2.8 ACCESSORIES DUCTWORK

A. Adhesives:

1. General: Maximum Flame Spread/Smoke Developed Rating of 25/50, SCAQMD Rule 1168 compliant.

2. Fiberglass: Benjamin Foster 85-62, Design Polymerics 2501/2502

3. Elastomeric: Armacell 520 BLV

4. Duct Insulation, Internal: Foster 85-62, Design Polymerics 2501/2502

B. Weld Pins: Duro-Dyne with NC-1 nylon stop clips

C. Cements:

1. Insulating: Ryder.

2. Heat Transfer: Chemax Tracit-300

D. Wire Mesh: 1-inch mesh with 20 gauge annealed steel wire.

E. Mastic: Chicago Mastic:

1. Vapor Barrier: 17-475

2. Outdoor Mastic: 16-110 white

F. Cloth Facing: Presized fiberglass cloth

G. Tapes: Pressure sensitive, weather resistant, and for temperatures up to 150 degrees F. Zeston Z-tape.

H. Paint: Ultraviolet resistant latex paint with special adherence capabilities to the PVC fitting covers, elastomeric, aluminum facing, Kraft paper, tapes, and adhesives.

PART 3 EXECUTION

3.1 GENERAL

A. Workmanship:

1. Installation: Insulation installed in first class, neat professional manner.

2. Applicators: Employ by firm that specializes in insulation work.

B. Preparation: Surfaces of piping, ductwork, and equipment clean, free of oil or dirt, and dry before insulation is applied.

C. Stamps: ASME stamps, UL labels, and similar stamps and labels not covered.

3.2 HVAC PIPE AND EQUIPMENT INSULATION APPLIED LOCATIONS

A. Insulation Applied Locations – HVAC Piping:

System	Pipe Size	Insulation Type	Insulation Thickness	Notes
Condensate or other cold water drains	All	Elastomeric	1/2-inch	
Refrigerant Suction Hot Gas	1-1/4-inch and smaller	Elastomeric	1-inch	Note 3
Refrigerant Suction Hot Gas	1-1/2-inch and above	Elastomeric	1-1/2-inch	Note 3
Variable Refrigerant Flow (VRF) System Refrigerant Piping	1-inch and smaller	Elastomeric	1/2-inch	Note 4
Variable Refrigerant Flow (VRF) System Refrigerant Piping	1 1/8-inch and above	Elastomeric	1-inch	Note 4
Note 1: Cover with metal pipe jacket where exposed to weather and over heat trace cable. Note 2: Refer to specification 23 20 14 for additional pre-insulated piping systems requirements. Note 3: Elastomeric insulation not allowed over heat trace cable. Note 4: Or per VRF manufacturer installation recommendations.				

B. Include fittings, unions, flanges, mechanical couplings, valve bodies, valve bonnets, piping through sleeves, except valve bonnets, unions and flanges need not be insulated on the following systems:

1. Condensate, pumped condensate, inside building.

3.3 PIPING INSTALLATION

A. General:

1. Joints: Coat both sides of complete joining area with applicable adhesive.

a. Longitudinal Joints: Make joints on top or back of pipe to minimize visibility. Except foam plastic, seal with closure system or 3-inch wide tape.

b. Butt Joints: Butt lightly together and, except for foam plastic, seal with 3-inch wide tape or butt straps.

c. Multiple Layered Insulation: Joints staggered.

2. Access: Strainer and other items requiring service or maintenance with easily removable and replaceable section of insulation to provide access.

3. Voids:

a. Fill voids, chipped corners and other openings with insulating cement or material compatible with insulating material.

b. In insulation with Heat Tracing: Where piping is shown or specified to be heat traced, bed heat tape into heat transfer cement with insulation over heat tape and cement.

4. Seal joints, seams, and fittings of metal watertight jackets at exterior locations.

B. Fiberglass Insulation: Exterior insulation encased in metal jacket.

C. Elastomeric Insulation:

1. Slit full length and snap around pipe.

2. Make cuts perpendicular to insulating surface leaving no cut section exposed.

3. Do not stretch insulation to cover joints or fittings.

4. Seal joints in elastomeric insulation with adhesive.

5. Exterior insulation painted with two coats of specified paint in accordance with the manufacturer’s instructions and encase in metal jacket.

6. Sealing joints with tape will not be allowed.

D. Fittings: Insulation specified with continuous vapor barrier, the vapor barrier must not be violated.

1. On Elastomeric Insulation: Fittings covered with covers made up of mitered sections of insulation or with formed pipe fitting covers.

2. In Other Insulation: Fittings covered with insulation to the same level of the adjoining insulation or fill with insulating cement. Finish with pipe fitting covers or cloth facing and tape.

E. Unions, Mechanical Joints, Valves, etc.:

1. General:

a. As specified for fittings.

b. Minimum thickness same as specified for piping.

2. Unions: Build up insulation at least 1/2-inch beyond adjoining insulation.

3. Flanges: With square corners. Where flanges are not insulated, terminate adjacent insulation so flange bolts can be removed.

4. Flanged Valves: Insulation with square corners.

F. Vapor Barrier Insulation:

1. Refer to Section 23 05 29 Hangers, Supports, and Anchors for HVAC, for support requirements.

2. Piping which requires vapor barrier protection has a continuous vapor barrier, which may not be pierced or broken. The following piping systems require vapor barrier protection:

a. Chilled water including radiant cooling water.

b. Brine water.

c. Refrigerant suction.

d. Other piping systems with a nominal operating temperature below 65 degrees F.

3. Vapor Barrier Insulation.

a. Insulation for pipe requiring vapor barrier protection 1-1/4-inch or smaller, insulation continuous through pipe hangers and rollers.

b. For pipe 1-1/2-inch and larger, 18-inch section of calcium silicate, same thickness as pipe insulation with continuous vapor barrier jacket at each hanger or roller. Provide pipe shield specified in Section 23 05 29, Hangers, Supports, and Anchors for HVAC.

G. Non-Vapor Barrier Insulation:

1. Refer to Section 23 05 29, Hangers, Supports, and Anchors for HVAC for support requirements.

2. Pipe 1-1/4-inch or Smaller: Isulation continuous through pipe hangers and rollers.

3. Pipe 1-1/2-inch and Larger:

a. 18-inch section of calcium silicate, same thickness as pipe insulation.

b. Provide pipe shield specified in Section 23 05 29, Hangers, Supports, and Anchors for HVAC.

3.4 EQUIPMENT INSTALLATION

A. General: Install true and smooth. Insulation over curved surfaces conform to curves of surface.

1. Access:

a. Insulated removable heads, water boxes, pump casings, access, etc., that require service, inspection or maintenance provided with covers or section that are easily removable and replaceable.

b. Reinforce openings in adjacent insulation with metal beading.

c. In vapor barriered insulation, coat joints with vapor barrier mastic.

2. Voids, Depressions and Cavities: Voids, chipped corners and other openings filled with insulating cement or material compatible with insulating material.

3. Vapor Barriered Insulation:

a. Where insulation is specified to have a vapor barrier.

b. No broken or pierced barrier.

(1) Coated with vapor barrier mastic and patched with insulation facing or tape.

(2) Staples brush coated with vapor barrier coating.

(3) Raw edges coated with vapor barrier mastic covered and cover sealed to equipment surface.

4. Non-Vapor Barriered Insulation:

a. Patch with insulation facing or tape.

b. Cover raw edges and neatly bevel to the equipment surface.

5. Multilayered Insulation: With staggered joints.

B. Elastomeric Blanket:

1. Cut insulation to size, make corners with mitering cuts to preclude raw edges, continuously cement insulation to equipment with adhesive.

2. Cement both surfaces of joints and butt tightly together and cover raw edges with two coats of adhesive.

C. Expansion Joints:

1. Covered with larger size pipe insulation to allow full movement and be removable, ends turned back to pipe, coat with vapor barrier mastic on joints in vapor barriered system, and finished with cloth facing cemented to insulation with adhesive.

3.5 DUCT INSULATION APPLIED LOCATIONS

A. General:

1. Provide external insulation with continuous vapor barriers unless specifically noted otherwise.

2. Internally line ductwork completely to grille or diffuser or to indicated terminal points. Dimension shown are net inside of liner.

3. Internally lined ductwork need not be externally insulated.

4. In addition to locations described in specification, internally line medium, low, return and exhaust air ductwork where shown on drawings.

5. Internal lining is not allowed downstream of final filters in systems serving inpatient healthcare facilities.

B. Insulation Applied Location – HVAC Ductwork:

System	Location	Duct Type	Insulation Type	Thickness	Notes
Medium Pressure Supply*	Exposed or Visible (Including above a cloud ceiling)	Rectangular	Internally Lined	1-1/2-inch	
		Round/Oval	Internally Lined	1-1/2-inch	
	Concealed or in mechanical rooms	All	Fiberglass Blanket	1-1/2-inch	
	Exposed Outside Building Envelope	All	Internally Lined	3-inch	
	15-feet upstream and downstream of fans	All	Internally Lined	1-1/2-inch unless otherwise indicated	
Low Pressure Supply*	Exposed or Visible (Including above a cloud ceiling)	Rectangular	Internally Lined	1-1/2-inch	
		Round	Internally Lined	1-1/2-inch	Note 3
	Concealed or in mechanical rooms	All	Fiberglass Blanket	1-1/2-inch	
	Exposed Outside Building Envelope	All	Internally Lined	3-inch	Note 3

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System	Location	Duct Type	Insulation Type	Thickness	Notes
	Under Slab Ductwork	All	Internally Lined	2-inch	
	Downstream of Air Terminal Units	All	Internally Lined	1-1/2-inch	Note 1 Note 3
	15-feet upstream and downstream of fans	All	Internally Lined	1-1/2-inch unless otherwise indicated	Note 3
Return Air* (not insulated except)	Concealed Outside Building Envelope	All	Externally insulated without vapor barrier	2-inch	
	Exposed Outside Building Envelope	All	Internally Lined	2-inch	Note 3
	Under Slab Ductwork	All	Internally Lined	2-inch	Note 3
	15-feet upstream and downstream of fans	All	Internally Lined	1-inch unless otherwise indicated	Note 3
Exhaust Air* (not insulated except)	15-feet upstream and downstream of fans	All	Internally Lined	1-inch unless otherwise indicated	Note 3
	In Toilet Rooms, 10-feet downstream of exhaust grilles	All	Internally Lined	1-inch	Note 3
Outside Air (untempered)	Exposed or Visible (Including above a cloud ceiling)	Rectangular	Internally Lined	2-inch	
		Round	Internally Lined	2-inch	Note 3
	Concealed or in mechanical rooms	All	Fiberglass Blanket	2-inch	
Supply and Return Plenums	All	All	Internally Lined	2-inch	Note 2
Transfer Air	All	All	Internally Lined	1-inch	Note 3

* In addition to applied locations listed in this table, provide internally lined ductwork where indicated on drawings.
Note 1: Except ductwork downstream of terminal units serving patient care areas in hospitals
Note 2: Insulation not required on factory fabricated insulated housings and plenums (AHP).
Note 3: Where round or oval ductwork is indicated, provide double walled round/oval ductwork as specified in Section 23 31 02, HVAC Ducts and Casing-Medium Pressure, or provide internally lined rectangular ductwork with equivalent free area may be substituted.

3.6 DUCTWORK INSTALLATION

A. General:

1. Install in accordance with manufacturer's instruction.

2. Continuous vapor barrier. Coat with vapor barrier mastic and patch with facing or tape. Joints between insulation and access with vapor barrier mastic.

3. Insulation at access panels to be removable or attached to panel with edges of panel and opening reinforced with metal beading.

B. External Blanket Insulation:

1. Insulation secured to ductwork with 20-gauge snap wires 24-inches on center and at all joints.

2. Joints and seams lapped a minimum of 3-inches and sealed with jacket tape.

C. Board Insulation:

1. Rectangular ducts with weld pins spaced a maximum of 18-inches on center in both directions.

2. Corners made with joints, bending insulation around corners not allowed.

3. Joints and seams butted tight together.

4. Butt joints with 3-inch wide tape.

5. Corners finished with 3-inch wide tape.

D. Internal Duct Liner:

1. Air stream coated surface.

2. Weld pins spaced maximum of 15-inch on center in both directions and within 2-inches of corners and joints. Weld pins flush with liner surface.

3. Complete duct surface coated with adhesive and insulation pressed tightly thereto.

4. Provide edges at terminal points with metal beading and heavily coated with adhesive.

5. Heavily coat joints and corners with adhesive.

6. Damaged areas replaced or heavily coated with adhesive.

E. Plenums: Insulation on floors protected by wire mesh.

F. Blank-Off Panels: Insulation, enclosed with sheet metal on all sides. Joints with vapor barrier mastic and taped.

G. Volume Dampers: Where volume dampers do not allow for continuous insulation, terminate insulation clear of handle sweep, and finish edges to maintain vapor barrier and to prevent damage to the insulation.

3.7 DUCT, PIPE AND TERMINAL UNIT ACOUSTICAL WRAP

A. Installed in accordance with the manufacturer's instructions.

B. Applied locations for piping and duct systems:

1. Variable and constant volume terminal units with maximum air volumes over 2000 cfm. Wrap installed such that control devices are easily accessible without circumventing the acoustical value.

2. Where specified or indicated on drawings.

3.8 FIELD QUALITY CONTROL

A. Field Test: Test and approve systems prior to installation of insulation.

END OF SECTION

COMMISSIONING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. The commissioning process is described in Section 01 91 00 Commissioning.

B. Provide all labor and materials required to complete the commissioning of those Division 23, HVAC systems and equipment identified as Commissioned Systems and Equipment in Section 01 91 00 Commissioning.

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 01 91 00 Commissioning.

1.3 SUBMITTALS

A. Refer to Section 01 91 00 Commissioning.

1.4 COMMISSIONING SCOPE OF WORK - COMMISSIONING AGENT

A. Refer to Section 01 91 00 Commissioning.

1.5 COMMISSIONING SCOPE OF WORK - CONTRACTOR

A. Refer to Section 01 91 00 Commissioning.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. Refer to Section 01 91 00 Commissioning.

PART 3 EXECUTION

3.1 MEETINGS

A. Refer to Section 01 91 00 Commissioning.

3.2 INSTALLATION, CHECK-OUT, START-UP AND PREFUNCTIONAL CHECKS

A. Refer to Section 01 91 00 Commissioning.

3.3 FUNCTIONAL TESTING

A. Refer to Section 01 91 00 Commissioning.

3.4 TRAINING OF FACILITY OPERATING STAFF AND BUILDING OCCUPANTS

A. Refer to Section 01 91 00 Commissioning.

END OF SECTION

INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Materials and Equipment
2. Control Devices
3. DDC Field Panels
4. Connection to Existing Netwok
5. BACnet Compatibility
6. Operator Interface System
7. Application Programs
8. Input/Output Functions
9. Uninterruptable Power Supply
10. Energy Management System

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 22 05 93, Testing, Adjusting and Balancing for Plumbing

D. Section 23 05 93, Testing, Adjusting and Balancing

E. Section 23 08 00, Commissioning for HVAC

F. Section 23 09 93, Sequence of Operation for HVAC Controls

G. Section 23 21 13, Pipe and Pipe Fittings HVAC

1.3 QUALITY ASSURANCE

A. Provide control work by single company with specialists in the type of work required, so that only one control manufacturer is responsible for control and automation work for project.

B. Provide coordination with other contractors or subcontractors for work required by other trades for accomplishment of control work.

C. Prior to substantial completion, controls contractor must demonstrate to Owner that system is operating per the Specifications and final adjustments have been made as approved.

D. System, including components and appurtenances, configured and installed to yield a Mean Time Between Failure (MTBF) of at least 1,000 hours.

1.4 SUBMITTALS

A. System Drawings: Prepare on AutoCAD format and include the following:

1. Equipment installation, block diagrams, and wiring diagrams.

2. DDC panel physical layout and schematics.

3. Sensor and control wiring and installation drawings which identify each component and show interconnected or interlocked components.

4. Material and equipment descriptive material such as catalog cuts, diagrams, performance curves, and other data to demonstrate conformance with specifications.

5. Details of connections to power sources, including grounding.

6. Details of surge protection device installations.

7. Instrumentation and control diagrams.

8. Complete a written description of control sequences.

9. List of connected data points, including DDC panels to which they are connected, and input device (sensor, etc.).

10. Valve and damper schedules indicating flows, pressure drops, CVs, and actuator type.

11. Graphics: System graphics for review prior to implementation of programming.

B. Equipment Data: Submittals include complete data for materials, including field and system equipment.

C. Software Data:

1. Submittals consist of complete descriptions of system, command, and applications software as specified.

2. Include description of control sequences which are software based using detailed logic flow diagrams.

3. Diagrams indicate logic used to achieve control sequence of calculation specified, and show relationship between control sequence and application software packages specified.

D. Testing Submittals:

1. Provide test plan and test procedures for approval.

2. Explain in detail, step-by-step actions and expected results to demonstrate compliance with the requirements of this specification and methods for simulating necessary conditions of operation to demonstrate performance of the system.

3. Test plan and test procedures demonstrate capability of system to monitor and control equipment and to accomplish control and monitoring specified.

E. Operation and Maintenance Manuals:

1. Provide three complete sets of manuals bound in loose-leaf binders within 30 days after completing acceptance tests.

2. Identify each manuals contents on cover.

3. Manuals include names, addresses, and telephone numbers of each subcontractor installing equipment and systems and of nearest service representatives for each item of equipment and each system.

4. Place tab sheets at beginning of each chapter or section and at beginning of each appendix.

5. Final copies delivered after completion of the acceptance tests include modifications made during installation, checkout, and acceptance.

6. Operation and Maintenance Manuals to include hardware manual, software manual, operations manual, and maintenance manual.

7. Hardware Manual: Furnish a hardware manual describing equipment provided, including:

a. General description and specifications.

b. Installation and checkout procedures.

c. Equipment electrical schematics and layout drawings.

d. System schematics and I-O wiring lists.

e. Alignment and calibration procedures.

8. Software Manual:

a. Describe furnished software.

b. Oriented to programmers and describe calling requirements, data exchange requirements, data file requirements and other information necessary to enable proper integration, loading, testing, and program execution.

c. Provide one software manual per Operator’s Terminal.

9. Operator’s Manual: Provide procedures and instructions for operation of the system, including:

a. DDC Panels and Peripherals

b. System start-up and shutdown procedures.

c. Use of system, command, and applications software.

d. Alarm Presentation

e. Recovery and Restart Procedures

f. Report Generation

g. System Schematic Graphics

h. Provide one Operator's Manual per Operator's Terminal

10. Maintenance Manual: Provide descriptions of maintenance for equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.

11. Acceptance Test Forms: Maintenance manual includes copies of signed-off acceptance test forms.

1.5 ACCEPTANCE TESTING AND TRAINING

A. Site Testing:

1. General: Provide personnel, equipment, instrumentation, and supplies necessary to perform testing. Owner or Owner's representative will witness and sign off on acceptance testing.

2. Acceptance Test: Demonstrate compliance of completed control system with contract documents. Using approved test plan, physical and functional requirements of project demonstrated.

B. Training:

1. General:

a. Conduct training courses for designated personnel in operation and maintenance of system.

b. Oriented to specific system being installed under this contract.

c. Provide trainee with two additional copies provided for archival at project site.

d. Manuals include detailed description of the subject matter for each lesson.

e. Provide copies of audiovisuals to Owner.

f. Training day is defined as 8 hours of classroom instruction, including two, 15-minute breaks and excluding lunch time, Monday through Friday, during normal first shift in effect at training facility.

g. Notification of any planned training given to the Owner's representative at least 15 days prior to the training.

2. Operator's Training I:

   a. Teach first course at supplier's facility for period of two consecutive training days.

   b. Upon completion, each student, using appropriate documentation, perform elementary operations with guidance and describe general hardware architecture and functionality of system.

3. Operator's Training II:

   a. Teach second course at project site for a period of one training day after completion of Contractor's field testing.

   b. Include instruction on specific hardware configuration of installed system and specific instructions for operating the installed system.

   c. Upon completion, each student able to start system, operate the system, recover the system after failure, and describe the specific hardware architecture and operation of system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Automated Logic by Climatech

B. Unless otherwise noted, installed by manufacturer.

2.2 SYSTEM DESCRIPTION

A. General:

1. Provide a complete control system, consisting primarily of electronic direct digital control devices.

2. System consists of modular and distributed microprocessor based control and monitoring units connected together by communications trunks. Capable of global data sharing and communication between controllers.

3. System architecture distributed and not rely on central processing unit (CPU) for sharing point data between controllers, or for control functions requiring data from other controllers.

4. Multipurpose controller(s) consisting of CPU, system program, memory, power supply, and input/output drivers which communicated with terminal equipment controllers through a communications network.

5. Provide operator's interface.

6. Provide equipment, installation, wiring, and accessories as required but not necessarily specified to accomplish operations as described.

B. Environmental Conditions:

1. Rate DDC panels and other field equipment for continuous operation under ambient environmental conditions of 35 degrees F to 120 degrees F dry bulb and 10 percent to 95 percent relative humidity, noncondensing.

2. Instrumentation and control elements rated for continuous operation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered for the installation.

3. Install control devices in an enclosure suitable for the installed environment.

C. System Accuracy and Display:

1. DDC system to control space temperature with a range of 50 degrees F to 85 degrees F ±1 degrees F for conditioned space (display to nearest 0.5 degrees F); 15 degrees F to 130 degrees F ±1 degrees F for unconditioned space (display to nearest 0.5 degrees F). Return air humidity controlled to 20 percent RH to 35 percent RH ±3 percent RH.

2. DDC system to control duct temperature with a range of 40 degrees F to 140 degrees F ±1 degrees F (display to nearest 0.5 degrees F).

3. Water temperature with a range of 30 degrees F to 100 degrees F ±1 degrees F (display to nearest 0.5 degrees F); the range of 100 degrees F to 300 degrees F ±2 degrees F (display to nearest 0.5 degrees F); and water temperatures for the purpose of performing BTU calculations using differential temperatures to ±0.5 degrees F using matched sensors (display to nearest 0.5 degrees F).

4. Pressure with a range for the specific application ±5 percent of range.

2.3 MATERIALS AND EQUIPMENT

A. Controls and Power Wiring:

1. General: Electric equipment and wiring in accordance with Division 26, Electrical. Manual or automatic control and protective or signal devices required for operation specified, and control wiring required for controls and devices.

2. Wiring:

a. Field and Subfield Panels:

(1) Voltage in panels not to exceed 120V. Where devices are wired to higher voltages, mount in suitable individual enclosures or group in separate control panel.

(2) Coordinate electrical power supply with Division 26.

b. Motor Control Centers: Responsibility for correct voltage of holding coils and starter wiring in pre-wired motor control centers interfacing with automatic controls is included hereunder.

c. Wiring for DDC systems communications buses two conductor minimum 18 gauge foil-shielded, stranded twisted pair cable rated at 300 VDC or more than 80 degrees C.

3. Communications Links Surge Protection: Protect communications equipment against surges induced on any communications link. Cables and conductors which serve as communications links have surge protection circuits installed that meet the requirements of REA PE-60d.

4. Communications Links Overvoltage Protection: Protect communications equipment against overvoltage on any communications link conductors. Cables and conductors which serve as communications links have overvoltage protection for voltages up to 480 VAC rms, 60 Hz installed. Instrument fuses or fusible resistors are acceptable for this application.

5. Power Line Surge Protection:

a. Protect equipment connected to AC circuits from power line surges.

b. Do not use fuses for surge protection.

B. Control Panels:

1. Provide wall-mounted control panels as required to contain relays, terminal strips, power supplies and other equipment in building control system.

2. UL listed, minimum NEMA 1, minimum 14 gauge steel with stiffeners, continuous hinge doors, locking handles, single point latch.

2.4 CONTROL DEVICES

A. Motorized Control Dampers:

1. Multi-blade air foil type, except where either dimension is less than 10 inches a single blade may be used. Maximum blade length to be 48 inches. Provide parallel blades for positive or modulating mixing service and opposed blades for throttling service. Blades to be interlocking, minimum 16 gauge galvanized steel.

2. Compression type edge seals and side seating stops. Damper blades reinforced, have continuous full-length axle shafts, axle to axle linkage, and/or operating jackshafts as required to provide coordinated tracking of blades. Dampers over 25 square feet in area to be in two or more sections, with interconnected blades. Maximum air leakage of 3 cfm per square foot at 1-inch w.g. pressure. Provide automatic dampers except those specified to be provided with units. Tested in accordance with AMCA Standard No. 500. Based on Ruskin CD-60.

B. Damper Operators:

1. Electronic modulating actuators with low voltage DC or current positioning signal.

2. Each actuator have current limiting circuitry incorporated in its design to prevent damage to the actuator.

3. Modulating actuators be provided and accept 0-10 VDC or 2-10 VDC or 4-20 mA input signal.

4. Actuators provide the minimum torque required for proper close-off against the system pressure for the required application.

5. The spring return feature permits normally open or normally closed positions of the valve or damper.

6. Direct shaft mount rotational actuators have external adjustable stops to limit the travel in either direction.

7. Power actuators by 24 VAC.

C. Duct Static Pressure Transmitter:

1. Operating range 0 to 5-inches w.c. for duct mounted transmitter and 0 to 5-inches w.c. for fan high limit transmitters.

2. Sensors either diaphragm or rigid element bellows, electronic type.

3. Each transmitter be provided with stop cock and tubing for attacking portable pressure gauge.

4. Sensing tube securely mounted in duct with appropriate fitting.

5. Accuracy ±1 percent of span, maximum response time 1 second.

D. Current Transformer:

1. Current status switch, adjustable setpoint 1-135A, ±1 percent of range, capable of monitoring motor's status and detection of belt breaking or slipping.

2. Manufacturer:

a. Hawkeye 700

b. Or equal.

E. Building Static Pressure Transmitter:

1. Operating range of -0.1 to 0.1 inches w.c., linear to DDC system.

2. Sensing tubes located inside and outside building use shielding and/or surge tanks to minimize effects of wind.

3. Accuracy ±1 percent of span.

F. Products of Combustion Detectors: Duct smoke detectors are provided under Division 28, Electronic Safety and Security, with single set of SPDT auxiliary contacts for control contractor connection.

G. Emergency Stop Switch: Red, mushroom type, pull out to operate.

H. End Switches:

1. Turret head type SPDT

2. Manufacturer:

a. Square D Class 9007, Type C54B2

b. Or equal.

I. VAV Actuators:

1. Proportional 24 VAC actuators using a 4 to 20 mA range of control signals.

2. Stop automatically at end of travel and include a permanently lubricated gear train.

3. Furnished by the controls manufacturer and factory installed and tested by the terminal unit manufacturer.

J. Carbon Dioxide Sensor: Infrared sensing, Carbon Dioxide gas monitor. Based on Airtest TR9290 series.

1. Detection Range: 0-2000 ppm

2. Accuracy: +/- 3 percent of measured value

3. Response Time: 2 minutes

4. Outputs: 0-10V, 4-20 mA

5. Calibration: Self-calibrating, calibration not required

6. Power Requirement: 24 VAC/VDC ±20 percent, 50-60Hz (half-wave rectified)

7. Operating Temperature Range: 32 degrees F to 122 degrees F

8. Operating Humidity Range: 0 percent - 95 percent RH, Non-Condensing

9. Display: Provide sensor with digital display.

K. Airflow Stations:

1. Air Flow Station (Duct Mounted):

a. Manufacturers:

(1) Ebtron

(2) Kurz

b. General: Electronic air measuring system consisting of thermistor based sensor grid and microprocessor based electronics.

c. Sensor Probes: Thermistors probes and linear ICs, aluminum casing, duct mounted, wiring Teflon or kynar coated and encased, 20 degrees F to 160 degrees F operating range, weather resistant finish, flanged welded aluminum frame.

d. Microprocessor and Electronics: Solid state microprocessor, permanent non-volatile memory, regulated power supply, software based system, 0-5 vdc, 0-10 vdc, or 4-20 mA signals, linear flow and temperature outputs, line surge and transient protection.

e. Performance: ±2 percent, +20 fpm across total calibrated range of 0 to 5000 fpm, for duct mounted, 0-10,000 fpm for fan inlet mounted, repeatability better than ±0.4 percent of reading. Pressure drop not to exceed 0.005 inch W.G. at 2000 fpm.

f. Based On: Ebtron-Duct mounted XP000 series.

2. Air Flow Station (Fan Inlet):

a. Manufacturers:

(1) Ebtron

(2) Air Monitor

(3) Paragon

(4) Pace

(5) Or equal.

b. Fan inlet airflow traverse probe, multiple total and static pressure sensors place at concentric area centers along exterior surface of cylindrical probe, internally connected to averaging manifolds.

c. Dual end support swivel brackets suitable for mounting in fan inlet bell, aluminum construction, hard anodized finish.

d. Probes capable of producing steady, non-pulsating signals of standard total and static pressure, without need for flow corrections or factors with an accuracy of 3 percent of actual flow over a fan operating range of 6 to 1 capacity turndown.

e. Based On: Fan Inlet XF000 series.

3. Automatic Air Flow Station Measuring Damper:

a. Manufacturers:

(1) Ruskin IAQ50X

(2) Greenheck AMD-42

(3) Tamco/Ebtron Air-IQ

(4) Or equal.

b. Description: Automatic control damper with integral electronic airflow measuring system.

c. Dampers:

(1) Multi-blade, airfoil type, extruded aluminum.

(2) Full-length axle shafts.

(3) Damper blades operate in unison.

(4) Dampers exceeding 25 SF in area two or more sections.

(5) Assembled depth not to exceed 18-inches.

(6) Leakage rating not to exceed 4 cfm/sf at 1-inch static pressure when tested in accordance with AMCA Standard 500D.

d. Damper Actuator:

(1) 24 VAC electric modulating.

e. Air Flow Measurement Assembly: Includes airflow measuring station, controller, and associated tubing and connections.

(1) Measuring Range: 300 fpm to 2,000 fpm velocity.

(2) Accuracy: ±5 percent of reading.

(3) Solid state microprocessor.

(4) Linear flow output.

(5) Line surge and transient protection.

(6) Input Signal: 0-10 VDC.

(7) Output Signal: 0-10 VDC.

L. Airflow Transmitters:

1. Provide transmitter with 4-20 mA output signal, accurate to ±0.25 percent for full range, range selected based on the actual flow element and expected velocity pressure, and linear output on velocity turndown of 10 to 1. Setra Model C264.

2. Provide a calibration certificate for each unit.

2.5 DDC FIELD PANELS

A. Multipurpose Controllers:

1. Stand-alone microprocessor based panels, enclosed in sturdy metal enclosure with two standard RS232 interface ports, network communications module, power supply, and battery back-up.

2. Panels will be used to connect field sensors and control devices. Fully supervise each panel to detect failures. Construct panel so functions are implemented on replaceable circuit boards to permit field maintenance. Completely field programmable through portable terminal. Minimum 8-hour battery backup system.

3. Each DDC panel linked with data trunk cable to other controllers and Operator's Terminals to distribute information. Field panels continuously exchange data through trunk cable without requiring output to input wiring between panels. The system arranged so that operations are maintained without the central computer being connected to the system.

4. Upon failure of the DDC field panel, including transmission failure, the panel automatically forces the controls to remain in the last command status.

5. Provide a real time clock with calendar maintaining seconds, minutes, hours, and days of the week, accurate to ±10 seconds per day.

6. Provide sufficient memory to perform specified and shown DDC field panel functions and operations, including spares. Each DDC panel to have 10 percent minimum spare memory board spacing.

7. Each DDC field panel contain hardware to support power fail automatic restart.

8. Provide locking type mounting cabinets with common keying.

9. DDC field panel have built-in diagnostics to display to operator interface terminal any sensor transmitting signal out of its design range.

10. Control logic done with software resident in each local DDC panel. Auxiliary relays may be used only when required for load contact rating.

11. Panels UL listed.

B. Terminal Equipment Controller:

1. Terminal equipment controllers provided for each piece of equipment, as specified, and includes point inputs and outputs as necessary to perform specified control sequences.

2. Each controller performing space temperature control provided with a matching room temperature sensor, which include terminal jack to monitor hardware and software associated with controller.

3. Each room sensor includes setpoint adjustment dial, temperature indicator, and override switch. Override switch overrides night setback mode to normal (day) mode when activated by occupant. Adjustment dial and override switch may be locked out, overridden, or limited through software from central workstation or portable terminal.

4. Each controller independent of other network communications. Controller receives real time data from central workstation or multipurpose controller.

5. Controller utilizes proportional, integral, and derivative (PID) algorithms which is field adjustable.

6. Database and sequence of operation programs stored in non-volatile EEPROM and EPROM.

7. Controllers networked through communications link to the multipurpose controller.

8. Controllers powered from 24 VAC source. Provide dedicated power source. Coordinate with Division 26.

9. VAV box controllers include differential pressure transducer connected to manufacturer's standard velocity sensor, and includes provisions for both automatic and manual calibration of transducer to ensure against drift. Incorporate algorithm to allow for modulation of hot water heating valve, and supplementary hot water radiation valve. Fan-powered terminal units control series or parallel fan as appropriate. Provide fan status proof current switch.

2.6 CONNECTION TO EXISTING NETWORK

A. General: Communication between peer-to-peer DDC control panels via TCP/IP over the existing Ethernet system.

B. Provide software and system integration to seamlessly integrate to the existing server for common system graphics, alarming, paging out of alarms via existing paging system.

2.7 BACNET COMPATIBILITY

A. DDC System and components BACnet Data Communications Protocol compliant.

B. System fully integrated and installed as a complete package of BACnet compliant controls and instrumentation.

C. Capable of seamless BACnet integration with existing BACnet compliant devices as well as future BACnet compliant devices.

D. No portals or third party devices required for integration with existing or future equipment.

E. Devices utilized in the BACnet interface BACnet Testing Laboratories (BTL) listed and labeled.

2.8 OPERATOR INTERFACE SYSTEM

A. Web-Based Access:

1. Provide a web-based controls interface with at least three user login accounts and password each with the capability of different access privileges that performs data access, operator's commands, alarm notification, requests for reports, file generation, diagnostics, and modifications.

2. Controls accessible in mechanical room by direct connection from a laptop to a data port.

3. Provide a temporary computer located on-site in the mechanical room until the commissioning, testing, and balancing has been completed.

4. Provide a temporary computer located on-site in the mechanical room, with software and capabilities necessary to support commissioning, testing, and balancing and other activities required for project completion.

B. Graphics: Provide a complete graphics package with the following features:

1. Provide separate schematic diagram depicting each system. Diagrams to show major components such as fans, dampers, heating and cooling coils, humidifiers, pumps, heat exchangers, chillers, boilers, towers, ductwork, piping, etc., arranged to convey to viewer system configuration and flow of each system.

2. Provide plot plan, riser plan, and selected floor plans of buildings with the location of each mechanical room and major equipment location indicated.

3. Provide symbols superimposed on each schematic to indicate each control device including control valves, damper motors, temperature sensors, pressure sensors, etc. Provide real time dynamic displays of the temperature, humidity, pressure, flow rate, run status, alarm status, and etc., adjacent to each control symbol. Arrange CPU to update each displayed analog and digital value minimum of every 15 seconds.

4. Provide indication of setpoints, with each setpoint value located adjacent to each sensed value.

5. Provide means to allow the user to easily change or add graphics via computer assisted drawing function utilizing freehand mouse.

6. Provide means to allow user to transfer repeated system schematics and symbols between graphics without redrawing them. Provide symbol library arranged to store commonly used symbols.

7. Provide a “telescoping” or “zoom” program to allow use to move from plot plan to mechanical room plan to system graphic to control device display by simply clicking the mouse.

8. Provide dual function windowing program to allow user to view a split screen and toggle between simultaneous operations.

C. Trend Data Collection and Historical Data:

1. Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. Any system point may be trended automatically at time-intervals, time-synchronized intervals, change of value, or by event of which user-definable. Trend data collected and stored on hard disk for future diagnostics and reporting. Automatic trend collection may be scheduled of zones, events, and reports. Additionally, trend data may be archived to network drives or removable disk media for future retrieval.

2. Provide trend data reports to allow the user to view trended point data. Display data in both tabular and graphical format. Reports may be customized to include individual points or predefined groups of selected points. Provide additional functionality to allow predefined groups of up to 250 trended points to be easily transferred online to Microsoft Excel.

3. The following trend data provided for review by the commissioning agent:

   a. Adequate trending data maintained to evaluate system performance and diagnose system problems. Controls Contractor is responsible for trending points necessary to evaluate controlled equipment. Controls Contractor to coordinate with the Cx regarding trend intervals and specific points to be trended. The following systems trended and trend data provided for review by the commissioning agent at 15-minute intervals unless otherwise directed.

   b. Building electrical.

   c. Monitored temperatures including but not limited to space, supply, return, outside air, mixed air, chilled water, heating water, steam, pumped condensate, and etc.

   d. Occupancy modes as they apply to each piece of controlled equipment including but not limited to optimal start, occupied, unoccupied, temporarily occupied (override, etc.), night low limit, night high limit, night purge.

   e. Motor run commands and motor proofs for fans and pumps.

   f. VFD Speeds for controlled equipment.

   g. Measured airflows for both air handlers and volume control units.

   h. Damper positions for both air handlers and volume control units.

   i. Occupancy sensor indications used for HVAC control.

   j. Heat recovery system operation.

   k. Set points including but not limited to occupied and unoccupied space temperature, supply air temperature, hydronic supply temperature, radiant heating, and cooling temperature, pumping pressure, fan static pressure, etc.

   l. Supporting information necessary to evaluate setpoint reset sequences.

   m. Operating schedules for controlled equipment.

   n. Loop tuning variables.

2.9 APPLICATION PROGRAMS

A. General: Provide user-programmable DDC system programs with library of base-level predefined functions with user specified parameters.

B. Time of Day Scheduling:

1. A minimum of six schedules provided for equipment operation.

2. Seven unique days per schedule provided.

3. Program individual time cycle capability for each piece of equipment.

C. Control Priorities:

1. Provide an effective order of control priorities such that each succeeding level of optimization does not interfere with a more critical function.

2. Allow features as alarm actions and manual commands from the operator to override lower level functions (such as duty cycling or scheduling).

3. Events, initiated outside the DDC system causing equipment shutdown automatically reset when events causing the shutdown is cleared, such as power failure or fire alarm. For alarms within the control system, mechanical equipment restart after the alarm condition is manually reset.

D. Alarms: System provides following alarm processing capabilities:

1. Connected status or analog point may be designated as alarm input point.

2. Start/stop points with status feedback as well as associated analog alarms have user-programmable inhibit time assigned to each point to prevent nuisance alarms from occurring during startup of HVAC equipment.

3. Each alarmable point have change-of-state priority assignment assignable at 3 levels. One each for its level of criticality: low for such things as maintenance alarms, high for critical HVAC equipment alarms, and emergency for life safety alarms.

4. User may designate which conditions of alarm causes alarms to be initiated for display. The user may also designate alarm message for alarm condition and for return to normal condition as desired. Each message may be up to 32 characters in length and up to 32 messages are available in each digital management system.

5. This feature provides for orderly display of alarms based on criticality; alarm with highest level of priority displayed first.

6. User may designate which conditions of alarm causes alarms to be initiated for display. User may also designate alarm message for alarm condition and for return to normal condition as desired. Each message may be up to 80 characters in length.

7. Provide automatic phone dialing feature with the capability to report a general alarm recorded message.

E. Security: System supports multi-level password access with the following minimum access levels:

1. Read-only level, without capability of changing any part of software.

2. Adjustment level, allowing operator to adjust setpoints and schedules, force outputs on/off, but not to modify programming.

3. Full programming access.

4. System supports additional levels of programming access.

F. Power Failure:

1. In the event of the loss of normal power, there is an orderly shutdown of controllers to prevent the loss of database or operating system software.

2. Non-volatile memory incorporated for critical controller configuration data, and battery backup provided to support the real-time clock and volatile memory for a minimum of 72 hours.

a. During a loss of normal power, the control sequences go to normal system shutdown conditions.

b. Upon restoration of normal power and after a minimum off-time delay, the controller automatically resumes full operation without manual intervention through a normal soft-start sequence.

c. Should a controller memory be lost for any reason, the operator workstation automatically reloads the program without any intervention by the system operators.

G. Preventive maintenance software package.

2.10 INPUT/OUTPUT (I/O) FUNCTIONS

A. Analog Inputs (AI):

1. AI function monitors each analog input, perform A-to-D conversion, and hold the digital value in a buffer for interrogation.

2. Provide signal conditioning for each analog input.

3. Individually calibrate analog inputs for zero and span, in hardware or in software.

4. Minimum 12 bit A to D resolution.

B. Analog Outputs (AO):

1. The AO function accepts digital data, perform D-to-A conversion, and output a signal compatible with the operator.

2. Individually calibrate analog outputs for zero and span.

3. Provide short circuit protection.

4. Minimum 8 bit D to A resolution.

C. Digital Inputs (DI):

1. DI function accepts ON/OFF, OPEN/CLOSE or other change of state (two-state data) indications.

2. Provide isolation and protection against input voltage up to 180 Vac peak.

D. Digital Outputs (DO):

1. DO function provides contact closures for momentary and maintained operation of output devices.

2. Closures have a minimum duration of 0.1 second.

2.11 UNINTERRUPTABLE POWER SUPPLY (UPS)

A. General:

1. Provide an uninterruptable power supply (UPS) for each DDC field panel.

2. Fed by 120V AC emergency power circuits.

3. Floor or wall mountable.

B. UPS:

1. Provide MGE Pulsar UPS or pre-bid approved equal.

2. Products carry UL 1778 listing.

3. Base sizing on peak current requirements of connected load plus 15 percent factor of safety.

4. Provide manufacturer’s standard three-year comprehensive warranty, including batteries.

2.12 ENERGY MANAGEMENT SYSTEM

A. General:

1. Provide a complete system consisting of metering instruments, communications between components; communications network; data loggers; protocol converters and other appurtenances as required for a complete system.

2. Provide meters, network controllers, and Ethernet gateways with non-volatile flash memory sufficient to maintain system programming indefinitely.

B. Data Acquisition Network:

1. Connect meters to DDC system via TCP/IP communications over Ethernet LAN. Communications in BACnet/IP protocol.

2. The system may utilize Modbus for communication with field devices over local RS-485 communications links.

3. Connection to the building Ethernet network made at the nearest wall data outlet in a mechanical or electrical room.

4. Limit cabling lengths between devices in accordance with manufacturers published requirements.

C. Data Access and Display:

1. Measured values, both instantaneous readings and historical data, available to users on any computer with an Internet connection without requiring a specific operating system or proprietary software that is not publically available freeware.

2. Assign each metering a unique network address and by entering that address or corresponding URL into a web browser, HTML web pages of data available for that device.

3. Specific browser software permitted to be required to access system features beyond the measured values.

D. Data Format:

1. The complete system synchronizes to a single time base so that events on the system can be compared at different locations on the system using a common time base. Time base synchronized with DDC system.

2. Data stored in DDC system database.

E. Software:

1. Seamless BACnet/IP integrated with building Direct Digital Control, DDC system, and have the ability to display individual meter output data.

2. Calculation engine to virtually calculate, display, and store-derived values.

3. Minimum download meter data every 15 minutes.

F. Interface and Display:

1. Provide 32-inch LED flat panel display.

2. Scroll through display features in 20 second intervals (adjustable).

3. Display:

a. Monthly Utility Total Energy (kbtu) and EUI (kbtu/sf/yr) bar chart overlaid with the prior year by month. Use different colors to indicate the contribution of gas and electricity to each monthly total bar.

b. Monthly System Total Energy (kbtu) and EUI (kbtu/sf/yr) bar chart overlaid with the prior year by month. Use different colors to indicate the contribution of each end use (Mechanical, plug loads, plumbing, and lighting) to each monthly total bar.

c. Current Day's end use energy demand (kW) overlaid with the annual weekday and weekend average demand (kW), and temperature in a line chart. Provide separate slides for Lighting and Plug Load end uses.

d. Current Day's end use energy demand (kbtu/hr) overlaid with the annual weekday and weekend average demand (kbtu/hr), and temperature in a line chart. Provide separate slides for Mechanical and Plumbing Load end uses.

e. Energy Meter Gauge indicating real-time end use energy demand (kW and W/sf) for Lighting and Plug Loads.

f. Energy use pie chart indicating percent of annual energy from each endues (Mechanical, Plumbing, Plug Loads and Lighting).

g. Monthly water usage (gallons) and WUI (gallons/person/year) bar chart overlaid with the prior year by month.

G. Current Sensors and Transformers:

1. Current Transformers, 5 A:

a. Submetering:

(1) Accuracy: 1.0 percent (10 percent-100 percent of Current Transformer rating).

(2) Split-core: Flex-core, Hawkeye, Square-D, Veris.

2. Current Sensors; 0-5 VDC, 330 milli-volt:

a. Submetering:

(1) Accuracy: 1.0 percent (10 percent-100 percent of Current Transformer rating).

(2) Manufacturers: Square-D, Magnelab, Veris, Sentron.

H. Electrical Energy Meters:

1. Measured values: Real kWh, Reactive kVARh, apparent kVAh, kW, power factor, RMS power, and current per phase.

2. Voltage: monitored circuit voltage indicated in documents.

3. Current Transformers: Provide milli-volt compatible meters where milli-volt Current Transformers are used.

4. Minimum Current Transformer input amperage (5 Amp Current Transformer only): 10A.

5. Sampling rate: minimum 3 kHz.

6. Submetering Meter Accuracy: +/-1 percent accuracy (10 percent to 100 percent of Current Transformer rating).

7. Manufacturers: Veris E50, Siemens, Square D.

PART 3 EXECUTION

3.1 INSTALLATION

A. Operator Workstation: Locate as shown or submit proposed location where not shown.

B. Mounting Panels: Locate panels where shown on Drawings or near item of equipment to be controlled, but not on equipment itself.

C. DDC Field Panels: Provide number of panels required to accommodate DI, DO, AI, and AO points and hardware and software to accomplish specified control sequenced. Locate panels in mechanical or electrical rooms. Submit proposed locations for approval prior to preparing control drawings.

D. Pneumatic Signals: The use of pneumatic signals to start and stop motors is not allowed.

E. Electrical:

1. Provide control wiring for control devices and control panels.

2. Run control wiring in conduit.

3. Provide power wiring for control devices and control panels. Utilize designated circuits in electrical power panels. Refer to Electrical Drawings. If no circuits are designated for DDC Controls, submit detailed request for use of spare circuits at no additional cost.

4. Install power wiring in conduit.

5. Grounding: Instrumentation and communication grounding installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

6. Control voltage limited to maximum of 120V.

7. Where relay coil is connected to load side of motor starter to energize with motor operation, external control circuit properly fused with fuse block located in respective starter enclosure.

8. Where relays are used to control single-phase motors directly, provide contacts rated for not less than horsepower rating of largest motor switched by relay.

F. Identification: Provide engraved nameplates identifying switches, lights and starters, and each control device where control function is not readily apparent.

G. Room Thermostats and Room Sensors:

1. Wall Thermostats and Room Sensors with User Adjustment: Mount at height of 48-inches above finished floor.

2. Provide insulating back on thermostats mounted on exterior walls.

3. Provide one thermostat for each zone of temperature control.

4. Submit proposed locations for approval prior to preparing control drawings, where not shown or alternate location is proposed.

H. Carbon Dioxide Sensor:

1. Mount sensor at 5 feet above finished floor or as indicated on the plans.

2. Provide sensor quantity as indicated on plans or as required by sensor coverage rating (maximum 20-foot radius).

3. Alarm above 850 ppm.

4. Refer to sequence of operations for more information on sensor use.

I. Airflow Station (Duct-Mounted):

1. Install grid array in ductwork according to manufacturer's recommendations.

2. Provide gasket between frame and duct.

J. Airflow Station (Fan Inlet): Install in fan inlet bell in accordance with the manufacturer's instructions.

K. Automatic Air Flow Station Measuring Damper: Install in accordance with the manufacturer's recommendations.

3.2 ENERGY METERS

A. System wiring configured such that any metering instrument can be isolated and removed from the system without the need to de-energize any power or protective circuit. This requirement may be met in one of two ways:

1. Connections to the metering instrument may be made using separable terminal blocks. The terminal blocks for current transformer circuits short the current transformer circuit prior to breaking the metering instrument circuit on removal and makes the metering instrument circuit prior to unshorting the current transformer circuit on insertion. Current transformer and line voltage terminals finger safe when left disconnected and energized.

2. Connections to the metering instrument may be made through test blocks with disconnecting switches for line and neutral voltage circuits and shorting switches for current transformer circuits.

B. System wiring within any switchgear of switchboard assembly Type SIS. Termination of Current Transformers in accordance with manufacturer's published requirements.

C. Provide overcurrent protection for metering equipment based on manufacturer's guidelines and the available fault current at the measurement point. This requirement may be met in one of three ways:

1. Meter within 30-feet of Current Transformers:

a. Provide meter housing with integral fusing.

b. Provide circuit breaker or fused disconnecting means adjacent to equipment monitored.

c. Provide PT with integral fusing.

2. Meter over 30 feet from Current Transformers:

a. Provide circuit breaker disconnect at equipment location for meter point and individual conductor fusing at meter equipment location.

D. Provide Current Transformers sized based on minimum circuit ampacity listed on equipment nameplate or circuit overcurrent protection device rating.

E. Provide Current Transformer conductors sized per manufacturer's published requirements based on length of run.

F. NEMA 1 housing unless noted otherwise. Located in a rooftop or exterior environment in NEMA 3R housing.

G. Provide additional NEMA enclosures as necessary for Current Transformers in order to provide manufacturer recommended clearances between separate Current Transformers.

H. Instrumentation calibrated based on National Institute of Standards and Technology, NIST, procedures.

END OF SECTION

PIPE AND PIPE FITTINGS HVAC

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Copper Pipe
2. Flanged Joints
3. Unions
4. Soldering and Brazing

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 25 00, HVAC Water Treatment

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Piping material and installation to meet requirements of the local building codes and serving utility requirements.

B. Grooved joint couplings and fittings products of a single manufacturer. Grooving tools by the same manufacturer as the grooved components.

1. Castings used for coupling housings, fittings, valve bodies, etc., date stamped for quality assurance and traceability.

C. Pipe Cleaning: Should any pipe be plugged or should foaming of water systems occur, disconnect piping, re-clean, and reconnect without additional expense to the Owner.

D. Correct damage to the building or systems resulting from failure to properly clean the system without additional expense to the Owner.

1.4 SUBMITTALS

A. Submit the Following:

1. List of piping materials indicating the service it is being used for. Do not submit piping product data.
2. Product data on mechanical couplings and related components, double wall fuel oil pipe and fittings, and polypropylene waste and vent pipe.
3. Certificate of completion

4. Treatment Reports

B. Test Reports and Certificates: Submit certificates of inspections and pipe tests to Owner.

C. Other: Make certified welders' certificates available.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. As indicated.

2.2 COPPER PIPE

A. Pipe: Hard drawn copper tubing, Class L, ASTM B 88.

B. Fittings:

1. Wrought copper, 150 psi; ANSI B16.22 for soldered joints, ANSI B16.50 for brazed joints; Chase, Revere, Mueller or approved equal.

C. Service:

1. Refrigerant piping (Type L, hard drawn, ACR cleaned).

2. Coil condensate drains and traps, cooling tower drains, and other miscellaneous drains.

2.3 UNIONS

A. 150 psi malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe. 200 psi WOG bronze, ground joint, solder type for copper tubing.

B. Dielectric Fittings:

1. Nationally listed, have a dielectric thermoplastic interior lining, and meet requirements of ASTM F1545.

2. Suitable for the pressure and temperature to be encountered.

2.4 SOLDERING AND BRAZING

A. Brazed Joints:

1. Westinghouse Phos-Copper or Dyna-Flow by J.W. Harris Co., Inc.

2. Applied locations:

a. Below grade piping.

b. Above grade piping larger than 2-inches for the following services: heating water, chilled water, condenser water, heat recover water.

c. Refrigerant piping. Braze in accordance with Copper Development Association Copper Tube Handbook using BCUP series filler material.

B. Soldered Joints:

1. Wrought Copper Pipe Fittings: All-State 430 with Duzall Flux, Engelhard Silvabrite with Engelhard General Purpose Flux or J.W. Harris Co.

2. Valves, Cast Fittings or Bronze Fittings: Harris Stay-Silv-15 or Handy & Harmon Sil-Fos.

3. Applied locations: Above grade piping 2-inch and smaller for the following services: Heating water, chilled water, condenser water, heat recovery water, industrial cold water, trap priming lines.

C. Valves, Cast Fittings or Bronze Fittings: Harris Stay-Silv-15 or Handy & Harmon Sil-Fos.

PART 3 EXECUTION

3.1 PREPARATION

A. Measurements, Lines and Levels:

1. Check dimension at the building site and establish lines and levels for work specified in this Section.

2. Establish inverts, slopes, and manhole elevations by instrument, working from an established datum point. Provide elevation markers for use in determining slopes and elevations in accordance with Drawings and Specifications.

3. Use established grid and area lines for locating trenches in relation to building and boundaries.

3.2 PIPING INSTALLATION

A. Install unions in non-flanged piping connections to apparatus and adjacent to screwed control valves, traps, and appurtenances requiring removal for servicing so located that piping may be disconnected without disturbing the general system.

B. Mechanical Pipe Couplings and Fittings:

1. Grooved joint couplings, fittings, valves, and specialties products of a single manufacturer. Grooving tools of the same manufacturer as the grooved components.

2. Flexible couplings to be used only when expansion, contraction, deflection or noise and vibration is to be dampened, as detailed or specified.

3. On systems using galvanized pipe and fittings, fittings galvanized at factory.

4. Before assembly of couplings, lightly coat pipe ends and outside of gaskets with approved lubricant.

5. Pipe grooving in accordance with manufacturer's specifications contained in latest published literature.

6. Mold and produce gaskets by coupling manufacturer, and suitable for the intended service.

7. Coupling manufacturer's factory trained representative to provide on-site training for the contractor's field personnel in the use of grooving tools and installation of grooved joint products. Periodically visit the project site to ensure best practices in grooved installation are being followed (a distributor's representative is not considered qualified to conduct the training or field visits).

3.3 PIPING JOINTS

A. Pipe and Fittings:

1. Join using methods and materials recommended by manufacturer in conformance with standard practice and applicable codes.

2. Cleaning, cutting, reaming, grooving, etc. done with proper tools and equipment.

3. Hacksaw pipe cutting prohibited.

4. Peening of welds to stop leaks not permitted.

B. Purge refrigerant piping with nitrogen continuously during the piping installation, and seal each branch outlet with Visqueen and tape or similar method to assure continued cleanliness of interior of piping until system is completed.

C. Copper Piping:

1. Pipe cut evenly with cutter, ream to full inside diameter; end of pipe and inside of fitting thoroughly cleaned and polished.

2. Joints uniformly heated, and capillary space completely filled with solder or braze material, leaving full bead around entire circumference.

D. No couplings installed in floor or wall sleeves.

E. Screwed Joints: Use Teflon tape or Teflon liquid dope applied to male threads only.

F. Flexible Couplings: Provide where indicated on the Drawings.

3.4 ADJUSTING AND CLEANING

A. General:

1. Clean interior of piping before installation.

2. Flush sediment out of piping systems after installation before connecting mechanical equipment to the piping.

3. When placing the water systems in service during construction, each system cleaned by circulating a solution with 1000 ppm of trisodium phosphate for 24 hours, then drained, flushed and placed in service.

4. Clean strainers prior to placing in service.

END OF SECTION

HVAC DUCTS AND CASING – LOW PRESSURE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Supports, Anchorage And Restraints
2. Sheet Metal Ductwork
3. Single Wall Housing Plenums
4. Flexible Ducts
5. Acoustical Lined Plenums

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 22 30 00, Plumbing Equipment

D. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping Equipment

E. Section 23 07 00, Insulation for HVAC

F. Section 23 33 00, Air Duct Accessories

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Work performed by qualified, experienced mechanics, in accordance with the manual of Duct and Sheet Metal Construction of the Sheet Metal and Air Conditioning Contractors National Association and these Specifications.

B. Regulatory Requirements:

1. Entire ductwork system, including materials and installation, installed in accordance with NFPA 90A.
2. Ductwork and components UL 181 listed, Class I air duct, flame rating not to exceed 25 and smoke rating not to exceed 50.

1.4 SUBMITTALS

A. Submit the following:

1. Provide catalog data on each product specified hereunder.
2. Schedule of duct construction standards.

3. Provide shop drawings showing materials and construction details for single wall housing plenum.

4. Provide shop drawings showing construction details, support, and seismic restraint of ductwork distribution systems.

PART 2 PRODUCTS

2.1 SUPPORTS, ANCHORAGE AND RESTRAINTS

A. General:

1. Provide design for supports, anchorages, and seismic restraints for equipment when not shown on the Drawings.

2. Supports, anchorage and restraints provided are required to resist seismic forces as specified in the latest edition of the International Building Code for the seismic zone in which the project is constructed.

3. Follow provisions in Section 23 05 48, Vibration and Seismic Control for HVAC Piping and Equipment for seismic restraints.

4. Seismic restraints are not to introduce stresses in the ductwork caused by thermal expansion or contraction.

5. Connections to structural framing are not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. Suspended Ductwork: Provide seismic restraints in accordance with the latest edition of the SMACNA, Seismic Restraint Manual - Guidelines for Mechanical Systems for the seismic hazard level corresponding to the seismic zone in which the project is constructed.

C. Engineered Support Systems: Provide designs and details for the following support systems with the seal of a professional engineer registered in the State having jurisdiction:

1. Supports and seismic restraints for suspended ductwork and equipment.

2. Support frames for ductwork and equipment which provide support from below.

3. Equipment and ductwork support frame anchorage to supporting slab or structure.

2.2 SHEETMETAL DUCTWORK

A. Fabricate from galvanized steel, unless noted otherwise.

B. Minimum gauge, duct construction, joint reinforcing, fittings, hangers, and supports in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible, Latest Edition.

C. Duct Classification: Ducts considered low pressure when design velocities are 2000 fpm or less and maximum static pressure is 2-inches wg positive or negative.

1. The following ductwork constructed in accordance with minimum reinforcement requirements for static pressure class of 1/2-inch wg positive or negative.

a. Supply ductwork downstream from terminal units.

b. Supply, return or exhaust ductwork serving fans scheduled to operate at less than 1/2-inch wg

c. Supply, return, or exhaust branch ductwork which serves one or two inlets/outlets.

2. The following ductwork constructed in accordance with minimum reinforcement requirements for static pressure class of 1-inch wg positive or negative.

a. Supply, return, or exhaust ductwork serving fans scheduled to operate at less than 1-inch wg On supply fans pressure drops for louvers, coils, clean filters, and sound traps may be deleted from scheduled fan static.

b. Supply, return, or exhaust ductwork serving multiple duct branches where contractor can demonstrate that pressures will not exceed 1-inch wg positive or negative.

c. Boiler direct vent combustion air intake ductwork.

d. Water heater direct vent combustion air intake ductwork.

3. The following ductwork constructed in accordance with minimum reinforcement requirements for static pressure class of 2-inches wg, positive or negative.

a. Supply, return, or exhaust ductwork serving fans scheduled to operate at pressures greater than 1-inch wg positive or negative.

D. Longitudinal seams on rectangular duct, Pittsburgh or Button punch snap lock. Snap lock seams for round duct may be used only on ducts classified for 1/2-inch wg. Longitudinal seams for round ducts using lap and rivet, spot weld, or fillet weld may be used only on ducts classified for statics 1-inch wg or less.

E. Joining and reinforcing systems manufactured by Ductmate, Roloc, or TDC are acceptable. Ductmate 35 is equivalent to SMACNA J, and Ductmate 25 is equivalent to SMACNA F.

F. Use of adjustable round elbows not permitted.

2.3 SINGLE WALL HOUSING PLENUMS

A. Fabricate from galvanized steel, unless otherwise noted.

B. Minimum gauge not less than 18 gauge except panels 10-feet-1-inch or longer 16 gauge.

C. Housing panels constructed in accordance with the latest edition of SMACNA HVAC Duct Construction Standards – Metal and Flexible.

D. Minimum pressure classification for single wall housing panels is 2-inches wg positive or negative.

E. Maximum allowable panel width 24-inches with standing interlocking seams.

F. Openings in panels for air inlets/outlets, or access doors reinforced per SMACNA standards.

G. Provide intermediate reinforcing and/or bracing when spans are 8-feet or longer.

H. Line interior surfaces of single wall plenums with minimum of 2-inch thick acoustical lining.

I. Access Doors:

1. Construct of 20-gauge galvanized steel, double wall construction.

2. Install in opening in plenum panel reinforced with 10-gauge channel.

3. Doors mounted on three hinges and seat against neoprene gaskets.

4. Doors in plenums at humidifiers have 12-inch by 12-inch double glass inserts from observation.

5. Doors 24-inch by 60-inch height unless otherwise indicated.

2.4 FLEXIBLE DUCTS

A. Flexible air duct with CPE or metal film liner permanently bonded to coated spring steel wire helix with 1-inch thick fiberglass insulation blanket covered with fiberglass reinforced metal film vapor barrier jacket.

B. Duct rated for 6-inch wg positive and 1-inch wg negative.

2.5 ACOUSTICAL LINED PLENUMS

A. Panels:

1. Double wall insulated panel consisting of 20-gauge galvanized steel perforated interior panel, 4-inch thick fiberglass insulation, and 18-gauge outer panel.

2. Panels located downstream of final filters have solid inside panel or sheet Mylar liner between inside perforated panel and insulation.

3. Panels of tongue and groove construction with adjacent panels held rigidly in position by self-interlocking joint effective inside or out. As alternate panels may be joined with H-channels.

B. Housing Construction:

1. Capable of withstanding pressures up to 4-inches WG positive on supply ductwork and 4-inches WG negative on return and exhaust ductwork.

2. Deflection at design pressure not to exceed 1/200 of span.

C. For spans 12-feet or greater, provide additional structural reinforcement.

PART 3 EXECUTION

3.1 APPLIED LOCATIONS

A. Supply ductwork on downstream side of terminal box. Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.

B. Supply Ductwork from Spin-In Fittings to Supply Outlet Collar Connection: Flexible duct, maximum 4-foot length.

C. Return Air Trunk Ductwork from End Run to Unit Connection: Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.

D. Exhaust Ductwork: Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.

E. Ductwork between Transfer Grilles: Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.

F. Ductwork Below Grade: Underslab ductwork, fiberglass.

G. Exposed or Visible Ductwork in Finished Spaces: Sheet metal as specified for application, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.

H. Acoustical lined plenums on inlet and outlet of rooftop units. Plenum size sufficient for duct connections as shown on plans, minimum plenum size, and same as unit opening.

3.2 INSTALLATION

A. Ductwork:

1. Seal traverse joints with an approved mastic during joining procedure or tape after joining to provide airtight duct system.

2. Low pressure ductwork hanger and support systems in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible. Wire supports are not allowed.

3. Provide supplementary steel for support of ductwork in shafts and between building structural members.

4. Fabricate changes in direction to permit easy air flow, using full 1.5D radius bends or fixed turning vanes in square elbows. Radius elbows less than 1.5D radius, splitter vanes.

5. Change in duct size or shape necessitated by interference made using rectangular equivalents of equal velocity.

6. Where pipe, structural member, or other obstruction passes through a duct, provide streamlined sheet metal collar around member and increase duct size to maintain net free area. Fit collar and caulk to make air tight.

B. Sound Attenuation (Internal Insulation):

1. Provide sound attenuation duct where shown and as specified under Section 23 07 00, Insulation for HVAC.

2. Duct dimensions shown are net inside attenuating material.

C. Dampers: Install where shown and where necessary to complete final balancing of system. Install regulators as specified in Section 23 33 00, Air Duct Accessories for each specific project condition. Leave dampers locked wide open in preparation for balancing.

D. Extractors: Install behind supply grilles and registers where shown.

E. Flexible Connectors: Make connections to fans and other rotating equipment with flexible connectors with 2-inch minimum clearance between casing and ductwork. Not required on internally spring isolated units.

F. Spin-in Fittings:

1. Install at branch takeoffs to outlets using round or flex duct.

2. Connect to flexible duct with draw band strap and minimum of two wraps of duct tape.

3. Leave dampers locked wide open.

G. Flexible Ducts:

1. Make connections at ends using draw band strap and a minimum of 2 wraps of duct tape.

2. Suspend center spans from structure above using wire as required by code. Connect to manufacturer's eyelet on jacket or use 1-inch wide galvanized steel strap with single loop at top and smooth edges.

3. Suspending duct by laying it on the ceiling is prohibited.

4. Avoid crimping flex duct. Changes in direction made using 2D radius. Duct connections to grilles, registers, and diffusers using less than 2D radius bends are not acceptable. Where space is constricted, use sheet metal elbows or Thermaflex Flex Boots (or equal).

H. Single Wall Housing Plenums:

1. Install housing plenums in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible, latest edition.

2. Joints and seams sealed with high pressure duct sealer or gaskets and fastened with bolts, screws, or pop rivets.

3. Pipe, duct, conduit, and control penetrations sealed to prevent air leakage using close off sheets and strips.

4. Securely anchor housing panels to floor or roof curbs.

5. Block outside air or return air dampers open to prevent damage during construction until automatic control system is operational and adjusted.

6. Provide access doors where indicated on drawings and where required to provide access for cleaning and maintenance. Access doors installed to open against air pressure.

7. Slope plenum and connected ductwork to drain towards the exterior louver or building exterior opening.

8. For single wall plenums installed behind exterior louvers or wall openings, slope plenum floor and connected ductwork at 1/4-inch/foot to drain towards the exterior louver or opening.

9. For single wall plenums installed below roof ventilators or roof openings, slope floor of plenum at 1/4-inch/foot to drain connection. Pipe drain connection to floor drain.

3.3 FIELD QUALITY CONTROL

A. Coordination with Balance Agency:

1. Provide services of a sheet metal person familiar with the system ductwork to provide assistance to the balancing agency during the initial phases of air balancing in locating sheet metal dampers.

2. Install missing dampers required to complete final balancing.

END OF SECTION

HVAC DUCTS AND CASING – MEDIUM PRESSURE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Supports, Anchorage, and Restraints
2. Single Wall Round Duct and Fittings
3. Single Wall Oval Duct and Fittings
4. Rectangular Steel Ductwork
5. Acoustical Lined Plenums

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment

D. Section 23 05 90, Pressure Testing for HVAC Systems

E. Section 23 07 00, Insulation for HVAC

F. Section 23 33 00, Air Duct Accessories

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Work performed by qualified, experienced mechanics, in accordance with the manual of Duct and Sheet Metal Construction of the Sheet Metal and Air Conditioning Contractors National Association and these Specifications.

B. Regulatory Requirements:

1. Entire ductwork system including materials and installation, installed in accordance with NFPA 90A.
2. Ductwork and components UL 181 listed Class I air duct, flame rating not to exceed 25 and smoke rating not to exceed 50.

1.4 SUBMITTALS

A. Submit the following:

1. Shop Drawings of ductwork specified hereunder. Include details of supports and seismic restraint of ductwork distribution systems.
2. Product data on medium pressure round and flat oval ductwork and fittings.

3. Schedule of rectangular duct construction standards.

PART 2 PRODUCTS

2.1 GENERAL

A. Fabricate from galvanized steel unless otherwise noted.

B. Minimum gauge, duct construction, joint reinforcing, fittings, hangers, and supports in accordance with the latest edition of SMACNA HVAC Duct Construction Standards, Third Edition, 2005.

C. Duct Classification:

1. Medium pressure when design velocities exceed 2000 fpm or static pressure is 2.0-inches wg or greater positive.

2. Ducts constructed in accordance with minimum reinforcement requirements for static pressure class of 4-inches positive.

2.2 SUPPORTS, ANCHORAGE AND RESTRAINTS

A. General:

1. Provide design for supports, anchorages, and seismic restraints for equipment when not shown on the Drawings.

2. Supports, anchorage and restraints provided are required to resist seismic forces as specified in the latest edition of the International Building Code for the seismic zone in which the project is constructed.

3. Follow provisions in Section 23 05 48, Vibration and Seismic Control for HVAC Piping and Equipment for seismic restraints.

4. Seismic restraints are not to introduce stresses in the ductwork caused by thermal expansion or contraction.

5. Connections to structural framing are not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. Suspended Ductwork: Provide seismic restraints in accordance with the latest edition of the SMACNA, Seismic Restraint Manual - Guidelines for Mechanical Systems for the seismic hazard level corresponding to the seismic zone in which the project is constructed.

C. Engineered Support Systems: Provide designs and details for the following support systems with the seal of a professional engineer registered in the State having jurisdiction:

1. Supports and seismic restraints for suspended ductwork and equipment.

2. Support frames for ductwork and equipment which provide support from below.

3. Equipment and ductwork support frame anchorage to supporting slab or structure.

2.3 SINGLE WALL ROUND DUCT AND FITTINGS

A. Materials:

1. Medium pressure round ductwork up to 36-inch diameter spiral lock seam. Round ducts over 36-inches in diameter either spiral lock seam or shop fabricated with longitudinal seams.

2. Takeoffs:

   a. Main and branch takeoffs similar to United Spiral Uniform Duct fittings type SRHTC, SRHTL, or SRHL, typically.

   b. No saddle fittings allowed.

   c. Welded fittings.

   d. Saddle fittings with pop rivet fasteners and sealed with high pressure duct sealer may be used only when adding takeoff fittings to existing duct.

3. Transitions, Elbows:

   a. Transitions of concentric type or eccentric type to maintain elevations detailed, with not more than 15 degree angle variation on sloped portion.

   b. 90 degree elbows of 5 piece design with centerline radius equal to 1-1/2 of duct diameter minimum. Mitered elbows not allowed.

   c. 60 degree and 45 degree elbows of 3 piece design with long radius.

   d. Y-Branch fittings similar to United Uniseal SRHY or SRHYR. Bull head tees not allowed.

2.4 SINGLE WALL OVAL DUCT AND FITTINGS

A. Materials:

1. Medium pressure oval ductwork through 24-inches minor axis (duct height) fabricated from spiral lock seam.

2. Ducts with minor axis above 24-inches fabricated from longitudinal seam ducts.

3. Takeoffs:

   a. Main and branch takeoffs similar to United Uniseal fittings type SOSTC, SOSTL, or SOSL, typically.

   b. No saddle fittings allowed except saddle fittings may be used with pop rivet fasteners and sealed with high pressure duct sealer when adding fittings to existing duct.

   c. Provide standing seam joints sealed with high pressure duct sealer, or provide welded joints, or provide spot welded joints sealed with high pressure duct sealer.

4. Transitions and Elbows:

   a. Transitions of concentric type or eccentric type to maintain elevations detailed, with not more than 15 degree angle variation on sloped portion.

   b. 90 degree elbows of pie stamped or 5 piece design with centerline radius equal to 1-1/2 of duct diameter minimum. Mitered elbows not allowed.

   c. 60 degree and 45 degree elbows of 3 piece design with long radius.

   d. Y-Branch fittings similar to United Uniseal SOSYH or SOSYE. Bull head tees not allowed.

2.5 RECTANGULAR STEEL DUCTWORK

A. Fabricate from galvanized steel unless noted otherwise.

B. Longitudinal seams, Pittsburg type. Button punch snap lock may be used only if sheet metal screws are added on 24-inch centers.

C. Joining and reinforcement systems as manufactured by Ductmate, Roloc, or TDC are acceptable. Ductmate 35 is equivalent to SMACNA J reinforcement and Ductwork 25 is equivalent of SMACNA F. Fasten Ductmate to duct with sheet metal screws minimum of 6-inch on center.

D. Fittings:

   1. Fabricate fittings for easiest airflow using radius elbows with center-line radius elbows equal to 1-1/2 times the duct dimension in the plane of the turn.

   2. Transitions: Concentric or eccentric type to maintain elevations with not more than 15 degree angle variation on sloped portion.

   3. Conical Taps: For branch take-off to terminal unit, construct with inlet 4-inches wider than outlet and no raw edges inside.

E. Use of mitered elbows with turning vanes is not acceptable except where indicated on drawings. Radius elbows with centerline radius less than 1.5D radius vaned type and may be used only with approval of engineer.

2.6 ACOUSTICAL LINED PLENUMS

A. Panels:

   1. Double wall insulated panel consisting of 20-gauge galvanized steel perforated interior panel, 4-inch thick fiberglass insulation, and 18 gauge outer panel.

   2. Panels located downstream of final filters solid inside panel or sheet Mylar liner between inside perforated panel and insulation.

B. Panels of tongue and groove construction with adjacent panels held rigidly in position by self-interlocking joint effective inside or out. As alternate panels may be joined with H-channels.

C. Housing construction capable of withstanding pressures up to 10-inches wg positive. Deflection at design pressure not to exceed 1/200 of span.

D. For spans 12-feet or greater, provide additional structural reinforcement.

E. Access Doors:

1. Construct of 20-gauge galvanized steel double wall construction, 24-inches wide by 60-inches high unless otherwise indicated.

2. Panel opening for door reinforced with 10-gauge channel.

3. Doors mounted on three ball bearing hinges and secured with two latches which can be open from either side.

4. Doors seat against neoprene gaskets for air tight seal.

5. Doors in plenums at humidifiers 12-inch by 12-inch double glass inserts for observation without opening doors.

PART 3 EXECUTION

3.1 APPLIED LOCATIONS

A. Supply ductwork on upstream side of air terminal unit.

B. Supply ductwork serving fans scheduled to operate at pressures greater than 2-inches wg positive.

C. Supply ductwork 20-feet downstream of air handling equipment and the first 6-feet of duct mains connect to the vertical ducts at each floor with round or oval double walled ductwork.

D. Acoustical line plenums on discharge of rooftop units. Plenum size sufficient for supply duct connections as shown on plans, minimum plenum size the same as unit opening.

3.2 MEDIUM PRESSURE ROUND AND OVAL DUCTWORK INSTALLATION

A. Install in accordance with manufacturer’s instructions and with the latest edition of SMACNA HVAC Duct Construction Standards.

B. Seal traverse and longitudinal joints with high pressure duct sealer and wrap with duct sealer tape or hard cast with minimum 2-inch overlap.

C. Field connections for ducts 36-inch diameter and less for round duct and 42-inches major axis and less for oval ducts not requiring additional reinforcing, use slip on connections. For other ducts use flanged joint connections, fabricated and sealed per manufacturer’s instructions.

D. Oval duct uses reinforced per SMACNA standards.

E. Branch takeoffs rigidly connected to terminal unit without flex duct.

3.3 MEDIUM PRESSURE RECTANGULAR DUCT INSTALLATION

A. Install duct, fittings, supports, and hangers in accordance with the latest edition of SMACNA HVAC Duct Construction Standards.

B. Seal traverse and longitudinal joints with high pressure duct sealer and wrap with duct sealer tape or hard cast with minimum 2-inch overlap.

C. Provide supplementary steel for support of ductwork in shafts and between building structural members.

D. Change in duct size or shape necessitated by interference made using rectangular equivalents of equal velocity.

3.4 ACOUSTICAL LINED PLENUM INSTALLATION

A. Install acoustical lined plenums in accordance with manufacturer's recommendations.

B. Joints and seams sealed with high pressure duct sealer or gaskets.

C. Fill void between panel sections with fiberglass insulation similar to panel insulation.

D. Roof channels, aprons, corner joints made of 16 gauge galvanized sheet metal and formed to prevent sound or air leakage.

E. Provide blank off panels between fans, filters, sound traps, etc. of 16 gauge metal and reinforced to pressure difference across device.

F. Floor channels anchored to concrete curbs.

G. Provide access doors where indicated on drawings and where required to provide access for cleaning and maintenance. Access doors installed to open against air pressure.

H. Provide supplemental structural steel supports for roof and walls requiring additional support. Plenum structure to be self-supported.

I. Seal pipe, duct, conduits, and control penetrations in accordance with manufacturer instructions and as detailed on drawings.

J. Openings for fan and duct outlets provided by panel manufacturer. Where openings cut across two or more panels, provide additional reinforcing.

3.5 FIELD QUALITY CONTROL

A. Field Tests: Perform leakage tests in accord with Section 23 05 90, Pressure Testing for HVAC Systems.

END OF SECTION

AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Medium Pressure Duct Accessories

2. Low Pressure Duct Accessories

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 31 01, HVAC Ducts and Casing-Low Pressure

D. Section 23 31 02, HVAC Ducts and Casing-Medium Pressure

E. Section 23 09 00, Instrumentation and Controls for HVAC

1.3 QUALITY ASSURANCE

A. Work performed by qualified, experienced mechanics in accordance with the manual of Duct and Sheet Metal Construction of the National Association of Sheet Metal and Air Conditioning Contractors and these Specifications.

B. Install entire ductwork system, including materials and installation, in accordance with NFPA 90A.

C. Flexible connectors, flexible equipment connections, tapes, and sealants listed as UL 181, Class I air duct. Flame spread rating not to exceed 25 and smoke developed rating not to exceed 50.

1.4 SUBMITTALS

A. Submit the following: Product data for Duct Accessories.

1. Medium Pressure Duct Accessories:

a. Acoustical Turning Vanes

b. Access Doors

c. Bell Mouth Fittings

d. Low Pressure Duct Accessories:

e. Access Doors

f. Backdraft Dampers

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Medium Pressure Duct Accessories:

1. Duct Sealer:

a. McGill Airseal Zero

b. Design Polymerics DP 1090.

c. Other Manufacturers: Submit substitution request.

2. Flexible Equipment Connector:

a. Duro Dyne Corporation

b. Ventfabrics

3. Acoustical Turning Vanes:

a. AirSan Acoustiturn

b. Or approved equal.

4. Access Doors:

a. United Sheetmetal APR or ASR

b. Metco

c. Semco

d. Cesco

e. Ruskin

f. Nailor-Hart

g. Or approved equal.

B. Low Pressure Duct Accessories:

1. Flexible Equipment Connector:

a. Duro Dyne Corporation

b. Ventfabrics

2. Extrators:

a. Carnes

b. Anemostat

c. Barber-Coleman

d. Nailor-Hart

e. Or approved equal.

3. Access Doors:

a. Air Balance

b. Ruskin

c. Metco

d. Duro Dyne Corporation

e. Cesco

f. Nailor-Hart

g. Or approved equal.

4. Backdraft Dampers:

a. Air Balance

b. Ruskin

c. Cesco

d. Advanced Air

e. Nailor-Hart

f. Or approved equal.

2.2 MEDIUM PRESSURE DUCT ACCESSORIES

A. Duct Sealer:

1. Description:

a. Suitable for indoor/outdoor use, including application in moist conditions, rated to 10-inch wg.

b. Maximum Flame Spread/Smoke Developed Rating of 25/50, maximum VOC of 420 g/L less water.

c. SCAQMD Rule 1168 compliant.

B. Flexible Equipment Connector:

1. Description: Woven fiberglass fabric with neoprene coating, air-tight, water-tight, fire retardant.

2. Minimum Density: 30 oz. per sq. yd.

3. Temperature Range: -20 degrees F to 200 degrees F

4. Pressure Range: -10-inch wg to +10-inch wg

C. Turning Vane Assemblies:

1. Sheet Metal Vanes: Multiple radius hollow vane air foil type with 4-1/2-inch inside radius, galvanized steel construction.

2. Runners: Embossed type.

D. Acoustical Turning Vanes: Multiple radius air foil type, perforated steel construction with fiberglass fill.

E. Access Doors:

1. Round, oval or rectangular to match duct, single wall to open against positive duct pressure, fastened with spring clips, pressure seal gasket, fastened with chain. Double wall access doors similar except provide insulated frame and insulated door.

F. Bell Mouth Fittings: Round or flat oval, radius of 0.20 D minimum.

2.3 LOW PRESSURE DUCT ACCESSORIES

A. Damper Regulators:

1. Acceptable Manufacturers:

a. Ventlok

b. Young

c. Duro Dyne Corporation

d. Approved equal

2. Dial Regulator – Concealed or exposed duct in unfinished spaces:

a. Blade lengths 18-inch and less: 3/8-inch shaft

b. Blade lengths 19-inches and above: 1/2-inch shafts

c. Ventlok 635, or 638 for insulated duct.

3. Dial Regulator – Exposed duct in finished space:

   a. 3/8-inch shaft

   b. Ventlok 640

4. Dial Regulator – Concealed or non-accessible duct:

   a. Blade lengths 18-inch and less: 3/8-inch shaft

   b. Blade lengths 19-inches and above: 1/2-inch shafts

   c. Ventlok 666 regulator with 680 mitered gear assembly where right angled turn is necessary.

5. End Bearings:

   a. Ducts rated to 1-inch WG, open end, Ventlok 607.

   b. Ducts rated above 1-inch WG, closed end, Ventlok 609.

   c. Exposed ductwork, finished spaces, Ventlock 609.

   d. Spring end bearings not allowed.

B. Volume Damper Fabrication:

1. Single blade dampers reinforced or crimped for rigidity, with pivot rod extending through duct. Dampers over 12-inches high use multiple opposed blade damper. Single blade damper no larger than 12-inches by 48-inches. Multiple blade damper factory fabricated, Ruskin MD-35 or equal.

2. Minimum gauge and duct construction in accordance with SMACNA, HVAC Duct Construction Standards, latest edition.

3. Splitter and butterfly dampers fabricated of 18 gauge galvanized steel.

4. Dampers of length suitable to close branch ducts without damper flutter.

5. Damper blade must be aligned with handle and index pointer.

C. Flexible Equipment Connector:

1. Description: Woven fiberglass fabric with neoprene coating, air-tight, water-tight, fire retardant.

2. Minimum Density: 30 oz. per sq. yd.

3. Temperature Range: -20 degrees F to 200 degrees F

4. Pressure Range: -10-inch wg to +10-inch wg

D. Extractors (EX): Gang operated blades, steel construction, blades at 1-inch centers, slide operator set 15 degrees into main trunk duct, Titus AG-45 with No. 1 operator.

E. Spin-in Fittings:

1. Sheet Metal Duct:

a. Straight pattern sheet metal spin-in fitting with scoops designed for connection to sheet metal ductwork, volume damper, and locking quadrant.

b. Construction with spot welds or rivets.

c. Button-punch fabrication prohibited.

F. Duct Sealer:

1. Based On:

a. McGill Airseal Zero

b. Design Polymerics DP 1090

2. Description:

a. Suitable for indoor/outdoor use, including application in moist conditions, rated to 10-inch wg.

b. Maximum Flame Spread/Smoke Developed Rating of 25/50, maximum VOC of 420 g/L less water.

c. SCAQMD Rule 1168 compliant.

G. Duct Tape for Sheet Metal:

1. ARNO C520 duct tape similar United

2. Duro Dyne Corporation

3. Nashua

H. Tape and Adhesive/Activator System for Sheet Metal: Hardcast, Polymer Adhesives.

I. Turning Vane Assemblies:

1. Sheet Metal Vanes: Multiple radius hollow vane air foil type 2-inch (small vane) or 4-1/2-inch (large vane) inside radius, galvanized steel construction.

2. Runners: Push-on type.

3. Acoustical Vanes: Multiple radius air foil type, perforated steel construction with fiberglass fill. AirSan Acoustiturn or as approved.

J. Access Doors:

1. Doors complete with steel frame, steel door with backing plate, cam latches (two on units 14-inch by 14-inch and larger), hinge, and gasketing. Insulate doors on insulated or lined ducts.

2. Size:

Duct Width or Duct Diameter	Net Access Door Opening
Up to 8-inch	6-inch by 6-inch
9-inch to 12-inch	8-inch by 8-inch
13-inch to 20-inch	12-inch by 12-inch
21-inch to 30-inch	16-inch by 14-inch
31-inch to 42-inch	18-inch by 14-inch
Over 42-inch	Two 16-inch by 14-inch

K. Backdraft Dampers:

1. Description: Gravity operated, vinyl edged, metal bladed backdraft dampers.

L. Drip Pans: Provide Type 304 stainless steel drip pans for cooling coils and exhaust heat recovery coils on built-up units as indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install devices as shown on the Contract Drawings and per manufacturer's recommendations.

B. Medium Pressure Duct Accessory installation specified under Section 23 31 02, HVAC Ducts and Casing-Medium Pressure.

C. Low Pressure Duct Accessory installation specified under Section 23 31 01, HVAC Ducts and Casing-Low Pressure.

D. Access Doors: Install where indicated and at duct mounted coils, humidifiers, automatic control dampers, smoke dampers, fire dampers, air flow stations, to provide access for cleaning and maintenance.

E. Back Draft Dampers: Install where indicated and at the discharge (or inlet) of exhaust fans where automatic dampers are not indicated.

F. Automatic Dampers:

1. Install where indicated and are not specified with equipment or in Section 23 09 00, Instrumentation and Controls for HVAC.

2. Coordinate damper operators with Section 23 09 00, Instrumentation and Controls for HVAC.

G. Drip Pans:

1. Install under each cooling coil and exhaust heat recovery coil as indicated.

2. Provide drain connection from each drip pan and pipe to nearest floor drain through trap.

3. Drip pans over 6-feet in length require drain connections from both ends.

4. Pitch drip pans in direction of air flow and to drain.

END OF SECTION

AIR TERMINAL UNITS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Single Duct Terminal Units

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 09 00, Instrumentation and Controls for HVAC

1.3 QUALITY ASSURANCE

A. Select units for sound levels, maximum pressure drops, and maximum inlet velocity as specified.

1.4 SUBMITTALS

A. Submit the following:

1. Catalog data, construction details, and performance characteristics for each type and size of terminal unit.

2. Data showing compliance with discharge and radiated sound power level specified.

3. Provide computer calculations for heating coils supplied with unit.

4. Schedule of each air terminal unit including data scheduled on drawings.

5. Operating and maintenance data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Single Duct Terminal Units:

1. Titus

2. Enviro-Tec

3. Price

4. Nailor

5. Krueger

6. Other Manufacturers: Submit substitution request.

2.2 SINGLE DUCT TERMINAL UNITS

A. Description: Single duct, medium velocity, pressure independent, variable volume.

B. Construction:

1. Casing:

a. Minimum 22 gauge galvanized steel.

b. Joints sealed and access doors gasketed, rectangular discharge with slip and drive connection.

c. Leakage rate to be maximum of 15 cfm at 3.0-inch differential SP.

d. Provide access door for cleaning of coil as an integral part of the unit.

2. Internal Lining:

a. General Applications:

(1) Coated dual density or matt faced insulation meeting NFPA 90A flame spread/smoke development rating of 25/50 or less and manufactured in accordance with UL 181.

(2) Liner not to contain Pentabrominated diphenyl ether or Octabrominated diphenyl ether.

C. Volume Regulator Assembly (DDC Controls):

1. Controller and actuator provided by Section 23 09 00, Instrumentation and Controls for HVAC, factory mounted in NEMA 1 enclosure.

2. Multi-point averaging flow sensor with taps for balancing.

3. 16 gauge corrosion-resistant single or opposed blade damper with extruded PVC seals or peripheral gasket with tight close-off. Leakage past closed damper not to exceed 2 percent of the nominal catalog rating at 3-inch wg inlet pressure. Solid steel shaft.

4. Air valves metal construction, non-corrosive, with bearings self-lubricating and moving parts replaceable in the field.

5. Assembled unit tested, factory preset, and guaranteed to provide ±5 percent total maximum airflow rate through an inlet pressure range of 0.5-inches to 3-inches water.

D. Air static pressure drop across terminal unit not to exceed 0.35-inch wg without coil and 0.6-inch wg with water coil. Maximum inlet duct velocities not to exceed 2200 fpm.

E. Sound Ratings: Tested as power level 10W to -12W in accordance with AHRI 880 standard and ASHRAE Standard 130 at 1-1/2 wg inlet static pressure. Unit discharge airborne and casing radiated sound not to exceed following rated sound power levels:

MAXIMUM AIRBORNE SOUND POWER (dB)							
CFM	OCTAVE BAND AND CENTER FREQUENCY (Hz)						
	63	125	250	500	1K	2K	4K
0 - 300	--	63	64	60	60	60	52
301 – 400	68	65	65	63	60	60	52
401 – 800	71	68	67	67	60	60	52
801 – 1200	73	72	68	67	60	60	52
1201 – 2000	73	75	69	67	60	60	54
2001 and above	--	80	78	76	67	67	60
* Units must have 5-feet of 2-inch thick lined duct or 3-feet 0-inch IAC MS sound trap provided with unit at units discharge to meet acoustic design goals							

MAXIMUM RADIATED SOUND POWER (dB)							
CFM	OCTAVE BAND AND CENTER FREQUENCY (Hz)						
	1	2	3	4	5	6	7
	63	125	250	500	1K	2K	4K
0-2000	71	68	61	61	55	55	50
2001 and above*							
* Units must have loaded vinyl wrap over 2-inch thick insulation							

PART 3 EXECUTION

3.1 INSTALLATION, TERMINAL UNITS

A. Support terminal units from structure using thread rod and brackets provided. Provide vibration isolation as indicated on plans, and as specified. Make a rigid duct connection to the inlet with minimum length of straight duct upstream of unit as recommended by the manufacturer or as noted whichever is greater.

B. Refer to Section 23 07 00, Insulation for HVAC for duct lining requirements at outlet of terminal units.

C. Maintain 3-feet clear in front of control enclosure.

D. Arrange units for operation with control system. Coordinate with the work specified in Section 23 09 00, Instrumentation for Controls for HVAC

E. Provide a minimum of 5-feet of ductwork prior to first spin-in fitting or outlet branch duct takeoff.

F. Install terminal unit to allow for complete access to controls, and items requiring maintenance or adjustment. When electrical disconnect is used, coordinate required clearance with NEC requirements, 36-inches minimum. In other cases maintain a minimum of 30-inches clearance directly in front of the controls.

G. Mount terminal unit controller, actuator to primary air valve, coil connections, control valve, and piping specialties on the same side of the terminal unit.

H. Install filters prior to operating equipment. Replace filters after substantial completion.

END OF SECTION

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Diffusers and Grilles

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 33 00, Duct Accessories

1.3 SUBMITTALS

A. Submit the following:

1. Shop Drawings: Showing dimensions and details of construction.

2. Product Data

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Where only Titus figure numbers are listed, equivalent products by the following manufacturers by using only one:

1. Carnes

2. Price

3. Krueger

4. Tuttle & Bailey

5. Anemostat

6. Nailor

7. Other Manufacturers: Submit substitution request.

2.2 DIFFUSERS AND GRILLES

A. Ceiling Supply Diffuser (C-1):

1. Perforated face modular diffuser with adjustable modular core, steel panel, square or rectangular neck size as indicated, discharge pattern as indicated, lay-in tee bar ceiling, or surface mounted as required (coordinate with architectural reflected ceiling plan).

2. White baked enamel finish, Titus PMC.

B. Ceiling Supply Diffuser (C-1):

1. Steel ceiling diffuser for lay in or surfaced mounted as required (coordinate with architectural reflected ceiling plans).

2. Steel face panel that captures a secondary formed panel

3. White baked acrylic finish, Titus OMNI.

C. Ceiling Return/Exhaust Grille (C-2): Perforated face modular ceiling grille, steel panel, with duct adapters for round or rectangular as indicated, lay-in tee bar ceiling, or surface mounted as required (coordinate with architectural reflected ceiling plan), white baked enamel finish, Titus PAR.

D. Slot Diffuser (S-5):

1. Extruded aluminum ceiling slot diffuser, pattern controller with 3-foot maximum length, length as indicated, 2 slots 3/4-inch wide, frame and border to match ceilings as indicated, provide end border, end caps, and mitered corners as required.

2. Provide insulated plenum boot with round duct connection, finish as selected by architect.

3. Titus ML 38.

E. Slot Return (S-6):

1. Extruded Aluminum ceiling slot diffuser, length as indicated. 2 slots 3/4-inch wide, frame and border to match ceilings as indicated, provide end border, end caps and mitered corners as required.

2. Finish as selected by architect.

3. Titus MLR 38.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install diffusers tight to their respective mounting surfaces.

B. Installed plumb and true with room dimensions and accurately centered on projections as shown on the Architectural reflected ceiling plans.

C. Install extractors behind duct mounted sidewall supply grilles, and where shown. Turning vanes allowable if condition is the last outlet on a branch.

D. Set pattern control for directions of throw as shown on Drawings prior to air balancer arriving on Project.

E. Paint ductwork behind outlets flat black.

3.2 PERFORMANCE

A. Unit sizing is based on air being introduced at 20 degrees F temperature differential and being diffused at the 5-foot level to a velocity not greater than 50 FPM and a temperature differential not greater than 1.5 degrees F. Units are also selected so as not to exceed the NC-30 curve.

END OF SECTION

HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. High Efficiency Pleated Filters
2. Filter Gauge

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

1.3 SUBMITTALS

A. Submit the following:

1. Shop Drawings: Details of construction and dimensional data.
2. Product Data: Air filters, gauges, including performance data.
3. Operation and maintenance data

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. High Efficiency Pleated Filters:

1. Camfil-Farr
2. Cambridge
3. American Air Filter
4. Eco-Air Products
5. Flanders Precisionaire

B. Filter Gauge:

1. Dwyer No. 2002-ASF
2. Other Manufacturers: Submit substitution request.

2.2 HIGH EFFICIENCY PLEATED FILTERS

A. Description:

1. 4-inch, pleated, rigid, replaceable, with glass media, media support grid, contour stabilizers, and galvanized steel enclosing frame.

2. Size of filter bank as indicated on drawings.

B. Rating: Unit efficiency of 80 percent, MERV 13 minimum rated based on ASHRAE Standard 52.1-1992 and 52.2-1999 respectively.

C. Performance: Filters capable of maintaining rated efficiency at 500 fpm face velocity with initial pressure drop not to exceed 0.60-inches wg and final pressure drop at 1-1/2-inches.

D. Frame: Provide complete factory assembled galvanized steel frame assembly suitable for filters, including necessary hardware for supporting and holding filters in place with an air tight seal around frame, upstream load on built-up systems, side access on air handling units.

E. Prefilters:

1. Replaceable type, 2-inch thick, glass fiber, installed in frame in front of high efficiency filters.

2. Prefilters capable of performance at 500 FPM.

2.3 FILTER GAUGE

A. Description:

1. Magnehelic Gauge with Plastic Vent Valves

2. Adjustable Signal Flag

3. External Front Screw for Zero Adjustment

B. Accessories:

1. Pressure Tap Plugs

2. Static Pressure Tips

3. Tubing

4. Mounting Adapters with Screws

C. Range: 0 to 2 inches wg, with 0.05-inch divisions.

PART 3 EXECUTION

3.1 INSTALLATION, PLEATED FILTERS

A. Arrange for access and removal of filter elements.

B. Install filters in air handling unit filter racks, filter grilles and other locations shown on the plans.

C. Air handling unit or fans not operated without specified filters properly installed.

3.2 INSTALLATION, FILTER GAUGE

A. Install filter gauge around each filter assembly with static pressure taps for entering and leaving side of filter.

B. Fasten tubing with metal fasteners.

3.3 PROTECTION

A. Equipment Operation During Construction:

1. Pleated Filters:

a. If air handlers are operated during construction, replace filters periodically as required to prevent dirt carryover.

b. Install clean filters prior to air balancing.

END OF SECTION

AIR TO AIR ENERGY RECOVERY UNITS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Heat Recovery Units

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 05 14, Variable Frequency Drives for HVAC Equipment

D. Section 23 05 29, Hangers, Supports, and Anchors for HVAC

E. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment

F. Section 23 09 00, Instrumentation and Controls for HVAC

1.3 SUBMITTALS

A. Submit the following:

1. Shop drawings showing details of construction, dimensions, arrangement of components, isolation, filters, etc.

2. Product data showing performance data, standard items and accessories, operating weight.

3. Operating and Maintenance Data

4. Coordination letter from controls vendor indicating control points have been coordinated between equipment supplier and controls vendor.

PART 2 PRODUCTS

2.1 MANUFACTURERS

1. Heat Recovery Units:

a. Wheel Type:

(1) Greenheck

(2) Cook

(3) Aaon

2.2 HEAT RECOVERY UNITS

A. Description:

1. Furnish complete packaged unit including cabinet, fans and motor assemblies, wheel heat exchanger, direct expansion cooling coils and filters. Suitable for rooftop installation.

2. Mount assemblies on a structural steel base.

3. UL approved for application and wired per NEC.

B. Cabinet:

1. 18 gauge (minimum) steel, hinged and latched panels for access to components.

2. Exterior finished with baked enamel, or powder coated paint finish, color – factory finish

3. Exterior Galvanized G-90 steel finish.

4. Casing internally insulated to a depth of 1-inch , enclosed to form double wall construction.

C. Configuration: Horizontal unit, ducted inlet, and outlet connection, with flex connection.

D. Gas Furnace:

1. Indirect gas fired 80 percent efficient, burner and heat exchanger constructed of aluminized steel.

2. Direct spark ignition, high temperature limit control.

3. Provide gas valve and modulating burner control and control transformer.

4. ETL Listed for Outdoor and Indoor installation to ANSI Z83.8-2002.

E. DX Cooling Coils:

1. Description:

a. Coils of nonferrous extended surface construction.

b. Primary surface of seamless copper tubing brazed into nonferrous headers.

c. Fins: Nonferrous, mechanically bonded to tubes, with fin spacing of ten fins per inch maximum.

d. Coils tested at 300 psi hydrostatic pressure.

e. Distributors: Pressure type, brass construction with copper distributing tubes.

f. Liquid and suction connections on same side.

g. 0.008-inch minimum fin thickness; 0.017-inch minimum tube wall thickness.

h. Capacity certified in accordance with ARI Standard 410-72. Face velocity not to exceed 500 fpm at specified air flow.

i. Match operating points with respective condensing unit.

F. Drain Pan:

1. Stainless steel drain pan with copper drain connection.

2. Pan to extend under coil for proper drainage of condensate.

3. Double sloped drain pan.

G. Fan and Motor:

1. Centrifugal type, belt driven, permanently lubricated motor.

2. Integrally mounted 1800 rpm motor, with prelubricated sealed ball bearings.

3. Energy efficient motors.

4. Ground and polished steel shaft mounted on permanently lubricated, sealed ball bearings. Bearings selected for a minimum L10 life in excess of 100,000 hours.

5. Separate motors for exhaust and supply fans.

6. V-belt drive sized for 150 percent of motor horsepower, with cast iron fixed sheaves for motors over 5 horsepower, variable pitch drives for motors 5 horsepower and under.

7. Multiple belt drives on units over 2 horsepower.

8. Sheaves statically and dynamically balanced.

9. Adjustable sheaves on belt driven fans with motors less than 10 hp to permit independent balancing of the exhaust and supply airflows.

10. Fan and motor assemblies to be mounted on a common base with vibration isolation provided from the casing and unit frame.

H. Filters:

1. Provide filters in the supply and exhaust steams upstream of the heat exchanger.

2. Provide medium efficiency and high efficiency pleated filters.

3. Refer to Section 23 40 00, HVAC Air Cleaning Devices.

4. Provide one extra set of each type of filters for each unit.

I. Variable Frequency Drives:

1. Mount in external weatherproof NEMA rated VFD enclosure.

2. Refer to Section 23 05 14, Variable Frequency Drives for HVAC Equipment for additional requirements.

J. Wheel Heat Exchanger Section:

1. Rotating styrene wheel treated with molecular sieve desiccant coating for latent and sensible energy recovery.

2. Mount wheel in a rigid frame containing drive motor, drive belt, wheel seals and bearings and purge.

3. Removeable heat wheel from unit without the use of tools.

4. Manufacturers that do not provide integral wheel in main unit cabinet must provide required mounting curbs, posts, required accessories, fans, pre-filters, dampers and insulated cabinet to provide fully assembled working unit.

K. Electrical:

1. Furnish magnetic contactors (starters), separate fusing, and control transformer.

2. Arrange unit for single point electrical connection with integral unit mounted disconnect.

L. Service Outlet:

1. Provide 115 VAC circuit with ground fault interrupter electrical outlet mounted in the unit controls cabinet.

2. Rate outlet circuit at 15A and factory wired to a step down transformer, fuse block, and 115V disconnect.

3. Wire circuit to line side of power block or power switch permitting use of the outlet while power to the unit is shut off.

M. Controls: Provide packaged unit controls.

1. Unit Mounted Control Panel control functions:

a. Discharge Air Temperature Control

b. Space Temperature Control

c. Occupied/Unoccupied Set/Points

d. Economizer Control based on OSA Temperature and Supply Air Temperature

e. Heating/Cooling Lockout Temperatures

N. Isolation Dampers:

1. Provide isolation dampers on the outside air intake and exhaust air discharge of the unit.

2. Automatic, motorized control dampers to provide shut off function when the unit is not in operation.

O. Weather Hoods: Provide intake and exhaust with weather hoods to prevent water intrusion (tested in accordance with AMAC Standard 500-L).

P. Vibration Isolators:

1. Provide as an integral part of each unit as indicated. Refer to Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

2. Coordinated weights and location of support points with the vibration isolation equipment supplier.

3. Provide vibration isolator restraints.

Q. Flexible Connections:

1. Constructed in accordance with UL 181, Class 1 airduct with flanged connections.

2. Flexible, neoprene-coated glass fabric not lighter than 30 oz/sq. yd.

3. Ventglas by Vent-Fabrics, Inc.

R. Warranty: One-year on parts.

PART 3 EXECUTION

3.1 HEAT RECOVERY UNIT

A. Installation:

1. Coordinate roof penetration with others.

2. Provide roof curb per Section 23 05 29.

3. Install unit where shown, with air filters in place before operating unit. Comply with manufacturer’s recommendation.

4. Provide minimum of 3-inch trap seal on condensate drain connections.

5. Keep access door to roof mounted equipment closed to prevent wind and weather damage.

B. Flexible Connections:

1. Provide flexible connections between fans and the connected ducts or plenums.

2. Install with 1-inch space between the fan and connecting duct with fabric snug but not stretched tightly.

3. Provide accurate alignment between fan and duct.

4. Secure in place with flanged connections. Do not crimp into the duct construction. Ends of the screws not to project into the duct more than 1/8 inch.

C. Start-Up:

1. General: Comply with manufacturer's instructions.

2. Start-up of units provided under the direct supervision of the manufacturer's representative with factory trained personnel.

D. Testing and Adjusting/Performance Test: Except where initial unit operation clearly shows the performance meets or exceeds the requirements, test to show compliance. Tests performed by the manufacturer's representative in the presence of the Engineer.

END OF SECTION

DECENTRALIZED UNITARY HVAC EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Rooftop Mounted Packaged HVAC Unit
2. Split System Air Conditioning Unit
3. Variable Refrigerant Flow (VRF) System

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 23, Heating, Ventilating, and Air Conditioning (HVAC)

C. Section 23 05 14, Variable Frequency Drives for HVAC Equipment

D. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment

E. Section 23 09 00, Instrumentation and Controls for HVAC

1.3 SUBMITTALS

A. Submit the following:

1. Shop drawings showing details of construction, dimensions, arrangement of components, isolation, filters, etc.
2. Product data showing performance data, standard items, and accessories, operating weight.
3. Flow diagrams and pipe sizing for refrigerant systems.
4. Operating and maintenance data.
5. Testing Submittals:

a. Provide test plan and test procedures for approval.

b. Explain in detail, step-by-step, actions and expected results to demonstrate compliance with the requirements of this specification and methods for simulating necessary conditions of operation to demonstrate performance of the system.

c. Test plan and test procedures demonstrate capability of system to monitor and control equipment and to accomplish control and monitoring specified.

1.4 ACCEPTANCE TESTING AND TRAINING

A. Site Testing:

1. General:

a. Provide personnel, equipment, instrumentation, and supplies necessary to perform testing by a representative authorized by the manufacturer.

b. Owner or Owner's representative will witness and sign off on acceptance testing.

2. Acceptance Test:

a. Demonstrate compliance of completed control system with contract documents.

b. Use approved test plan, physical and functional requirements of project

B. Training:

1. General:

a. A representative authorized by the manufacturer conduct training courses for designated personnel in operation and maintenance of system.

b. Orient training to specific system being installed under this contract.

c. Provide training manuals for each trainee, with two additional copies provided for archival at project site.

d. Manuals include detailed description of the subject matter for each lesson.

e. Copies of audiovisuals delivered to Owner.

f. Training day is defined as 8 hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during normal first shift in effect at training facility.

g. Notification of planned training given to the Owner's representative at least 15 days prior to the training.

2. Operator's Training I:

a. Teach at a convenient location for a period of one training day.

b. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations with guidance and describe general hardware architecture and functionality of system.

3. Operator's Training II:

a. Teach at project site for a period of one training day after completion of field-testing.

b. Course includes instruction on specific hardware configuration of installed system and specific instructions for operating the installed system.

c. Upon completion, each student should be able to start system, operate the system, recover the system after failure, and describe the specific hardware architecture and operation of system.

4. Operator's Training III:

a. Teach at project site for period of one training day no later than six months after completion of the acceptance test.

b. Course will be structured to address specific topics that students need to discuss and to answer questions concerning operation of system.

c. Upon completion, students should be fully proficient in system operation and have no unanswered questions regarding operation of installed system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Rooftop Mounted Packaged HVAC Unit:

1. Trane
2. Daikin
3. Carrier
4. York
5. AAON
6. Other Manufacturers: Submit substitution request.

B. Split System Air Conditioning Unit:

1. Mitsubishi (Mr. Slim)
2. Carrier
3. Trane
4. Lennox
5. Daikin
6. LG
7. Other Manufacturers: Submit substitution request.

C. Variable Refrigerant Flow (VRF) System:

1. Mitsubishi (City Multi)

2. Daikin (VRV)

3. LG (Multi-V)

4. The basis of design is LG Multi-V. Responsible for changes required from basis of design, such as pipe quantity, routing, control coordination, and power requirements if a different manufacturer is selected.

2.2 ROOFTOP MOUNTED PACKAGED HVAC UNIT

A. Description: Roof-mounted, single zone, variable volume packaged air conditioning unit designed for full curb mounting, natural gas heat, variable frequency drives, capacities as indicated, factory assembled, wired, piped, tested and shipped in one piece with UL listing.

B. Unit Casing:

1. Heavy gauge galvanized steel, phosphatized and coated with baked enamel finish, gasketed and insulated with 1-inch 1 pound density glass fiber insulation.

2. Gas-fired heat exchanger section insulation: Foil faced

C. Air Conditioning Refrigeration:

1. Air-cooled with refrigerant line filter drier, thermostatic expansion valve, factory refrigerant charge, high and low pressure cutouts, and loss of charge protection.

2. Low ambient operation to 40 degrees F.

3. Dual refrigeration circuits for units with two compressors and independent safety controls.

4. Provide refrigerant sight glass.

D. Compressors:

1. Hermetic type compressor with positive constant pressure lubrication, current and thermal overloads, crankcase heater, time delay, and anti-recycle relays.

2. Each unit contains a minimum of 2 compressors.

3. Provide compressor isolation valves.

E. Cooling Coils:

1. Provide indoor and outdoor coils of non-ferrous construction with aluminum fins mechanically bonded to seamless copper tubing with joints brazed.

2. Dual-circuited coils in units with two compressors.

3. Protect coils with plywood covers during shipment and installation.

4. Evaporator Coil Drain Pan: Stainless steel internally sealed and insulated.

F. Natural Gas Heating:

1. AGA approved for intended application and fuel, completely assembled, wired, piped, and tested with threaded gas connections.

2. Provide aluminized steel heat exchanger and burners, forced draft combustion blower, and electronic ignition.

3. Provide full modulation of heating.

G. Fans:

1. Indoor Fan: Centrifugal type, permanently lubricated, belt driven by a permanently lubricated motor.

2. Outdoor Fan: Propeller type direct driven by a permanently lubricated motor.

H. Filters:

1. Provide high efficiency pleated filters.

2. Provide filter curb when filters cannot be mounted in the unit.

3. Provide one extra set of filters for each unit.

I. Dampers:

1. Provide motor-operated outside air and return air dampers with spring-return actuators, capable of supplying 0 percent-100 percent outside air.

2. Outside air damper minimum position adjustable independently of return damper position.

3. Maximum leakage rate no greater than 15 CFM per SF. at 2-inches wg.

J. Economizer:

1. Enthalpy controlled type.

2. Outside air and return air dampers modulate to maintain discharge temperature on call for cooling.

3. Provide adjustable minimum outside air damper position.

4. Outside air and relief air dampers, close when indoor fan shuts down.

5. Provide relief capability equal to 100 percent of supply air with automatic motorized relief damper and weather hood.

K. Powered Exhaust: Provide relief air capability equal to 100 percent of supply air with exhaust fan, counterbalanced backdraft damper, and weather hood.

L. Controls: Complete, factory-installed control system with operating and safety controls. Include remote sensors and devices for field-installation.

1. Provide programmable 7-day thermostats with automatic change over, fan on-auto switch, system off-auto switch, and individual set point for heating and cooling. Provide minimum of four independent programmable temperature periods per day.

2. Economizer:

a. Provide enthalpy controlled type, with outside air sensor, return air sensor and logic control to select outside air as the first stage for cooling operation when favorable conditions are detected.

b. Outside air and return air dampers modulate to maintain discharge temperature on call for cooling.

3. Provide adjustable minimum outside air damper position. Outside air dampers close when indoor fan shuts down.

4. Demand Controlled Ventilation:

a. Provide an automatically adjustable minimum outside air damper position, controlled to maintain a set CO2 concentration in the occupied space.

b. Provide adjustable wall mounted CO2 sensor using Non-Dispersion-Infrared (NDIR) technology, gold plated sensor, LDC display, and automatic background calibration to reduce zero drift.

M. Electrical:

1. Furnish magnetic contactors (starters), separate fusing for compressors, condenser fans, evaporator fans and exhaust fans, and control transformer.

2. Arrange unit for single point electrical connection with integral unit mounted disconnect.

N. Service Outlet:

1. Provide 115 VAC circuit with ground fault interrupter electrical outlet mounted in the unit controls cabinet.

2. Outlet circuit rated at 15A and factory wired to a step down transformer, fuse block, and 115V disconnect.

3. Wire circuit to line side of power block or power switch permitting use of the outlet while power to the unit is shut off.

O. Variable Frequency Drives:

1. Mount integral to unit or in external weatherproof NEMA rated VFD enclosure.

2. Refer to Section 23 05 14, Variable Frequency Drives for HVAC Equipment for additional requirements.

P. Roof Curb:

1. Formed, 16 gauge galvanized steel with wood nailer strip capable of supporting entire unit weight.

2. Account for roof slope to provide level mounting service for equipment.

3. Provide spring isolated roof curbs where indicated or if fans and compressors are not internally isolated.

4. Curb height accounts for roof insulation depth and flashing requirements.

Q. Warranty: One-year on parts.

2.3 SPLIT-SYSTEM AIR CONDITIONING UNIT

A. Indoor Unit:

1. Description:

a. Furnish complete unit including cabinet, wall mounting kit and accessories, refrigerant line set, fan and motor assembly, cooling coil and filter.

b. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.

2. Cabinet: 18 gauge steel, removable panels for access to components. Drain connection and return air filter racks.

3. Fan and Motor:

a. Assembly with a turbo fan direct driven by a single motor.

b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.

c. Fan consists of two speeds:

(1) High

(2) Low.

4. Controls:

a. Run wiring direct from the indoor unit to the controller with no splices.

b. System capable of automatic restart when power is restored after power interruption

5. Condensate Pump: Provide condensate pump when required; pipe drain to floor drain.

B. Outdoor Unit:

1. Description:

a. Provide air-cooled air conditioner (outdoor unit) designed for outdoor installation with factory-supplied supports, properly assembled, and tested at the factory.

b. Completely weatherproofed and include compressor, condenser coils, condensing fans, motor, refrigerant reservoir, charging valve, controls, and a holding charge of R410A.

c. Provide guards on condenser fans and coil guard.

2. Compressors:

a. Furnish hermetically sealed type with isolation and sound muffling.

b. Overload and inherent winding thermostat protection to prevent burn out.

c. Provide crankcase heater.

d. Manifold multiple compressors for single joint connection on liquid and suction lines.

3. Refrigeration Circuits: Back seating service valve and gauge ports in liquid and suction lines. Provided refrigerant filter-dryer.

4. Condenser Fans and Motors: Direct driven propeller type fans with permanently lubricated motors.

5. Controls:

a. Provide high and low pressure cutouts, contactors and internal overload protection on motors.

b. Provide low ambient operation to 20 degrees F outside to maintain condensing temperature on part load operation.

c. Provide short cycle timer.

C. Controls Interface:

1. Equip with network port and network type data transfer interface with the DDC controller.

2. The following interface are required:

a. BACnet protocol compatible with the system specified in Section 23 09 00, Instrumentation and Controls for HVAC.

b. Alarms read to DDC controller.

c. Analog signals read to DDC controller as a minimum:

(1) Space Temperature

d. The following status signals be read to the DDC controller as a minimum:

(1) Occupied Cycle

(2) Unoccupied Cycle

(3) Warmup

(4) Override

(5) Supply Fan

(6) Compressors

(7) Heating/Cooling Operation

D. Controls Interface:

1. Equip with network port and network type data transfer interface with the system specified in Section 23 09 00, Instrumentation and Controls for HVAC.

2. Input and output points, setpoints and functions identified in the Sequences of Operation accessible to the DDC control system.

E. Electrical:

1. Furnish starters, contactors and disconnects.

2. Arrange for single point electrical connections.

3. Provide power and control wiring.

F. Controls:

1. Provide wall-mounted locally programmable 7-day thermostats with automatic change over, fan on-auto switch, system off-auto switch, and individual set point for heating and cooling with backlit LCD display.

2. Provide minimum of four independent programmable temperature periods per day.

3. Provide retrievable error codes in the event of system abnormality/error.

4. Hand-held remote controller is not acceptable.

2.4 VARIABLE REFRIGERANT FLOW SYSTEM (VRF)

A. Indoor Unit – Ceiling Cassette:

1. Description:

a. Ceiling-recessed cassette fan-coil unit.

b. Furnish complete unit including cabinet, ceiling mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan, and filter.

c. Unit as scheduled on drawing, factory-tested and assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.

2. Cabinet:

a. Ceiling-recessed cassette constructed of 18 gauge steel, removable panels for access to components.

b. Provide drain connection.

c. Painted finish.

d. Cabinet Panel: Provisions for a field installed filtered outside air intake.

e. Branch ducting allowed from cabinet. Fix grille to bottom of cabinet allowing four-way blow.

3. Fan and Motor:

a. Evaporator fan to have an assembly with one or two line-flow fan(s) direct driven by a single motor.

b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.

c. Consist of two speeds:

(1) High

(2) Low

4. Coil/Piping:

a. Indoor Coil: Direct expansion type of nonferrous construction with smooth plate fins on copper tubing.

b. Condensate Pan: Locate under coil.

c. Insulate both refrigerant lines.

5. Filter: Return air filtered by means of an easily removable, washable filter.

6. Electrical:

   a. Furnish starters, contactors and disconnects.

   b. Arrange for single point electrical connection.

7. Condensate Pump:

   a. Provide external condensate pump with hard-wired electrical connection when required.

   b. Pipe drain to floor drain.

B. Indoor Unit – Ceiling Concealed Ducted:

1. Description:

   a. Ceiling-concealed ducted fan coil designed to mount above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply.

   b. Furnish complete unit including cabinet, mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan, and filter.

   c. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.

2. Cabinet:

   a. Space saving, ceiling-concealed, ducted and have provisions for a field installed filtered outside air intake.

   b. Constructed of 18 gauge steel, removable panels for access to components.

   c. Provide drain connection.

3. Fan and Motor:

   a. Evaporator fan an assembly with one or two lines-flow fan(s) direct driven by a single motor.

   b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.

   c. Fan consist of two speeds, High and Low.

4. Coil/Piping:

   a. Indoor Coil: Direct expansion type of nonferrous construction with smooth plate fins on copper tubing.

   b. Condensate Pan: Locate under coil.

   c. Insulate both refrigerant lines.

5. Filter: Filter return air using standard factory installed return air filter.

6. Electrical:

   a. Furnish starters, contactors and disconnects.

   b. Arrange for single point electrical connection.

7. Condensate Pump:

   a. Provide external condensate pump with hard-wired electrical connection when required.

   b. Pipe drain to floor drain.

8. Condensate Drain Pan Sensor: Provide secondary condensate drain pan sensor interlocked to turn off unit upon detection. Based on Mitsubishi DPLS series.

C. Indoor Unit – Floor Standing Concealed or Exposed:

1. Description:

   a. Consist of a floor-standing indoor section.

   b. Furnish complete unit including cabinet, mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan, and filter.

   c. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shopped in one piece with ARI certification and UL listing.

2. Cabinet:

   a. 18 gauge steel, removable panels for access to components.

   b. Provide drain connection.

   c. Exposed Units: Painted finish.

   d. Concealed Units: Sheet metal finish.

3. Fan and Motor:

   a. Evaporator fan an assembly with one or two line-flow fan(s) direct driven by a single motor.

   b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.

   c. Consists of two speeds:

      (1) High

      (2) Low

4. Coil/Piping:

   a. Indoor Coil: Direct expansion type of nonferrous construction with smooth plate fins on copper tubing.

   b. Condensate Pan: Locate under coil.

   c. Insulate both refrigerant lines.

5. Filter: Return air filtered by means of an easily removable, washable filter.

6. Electrical:

   a. Furnish starters, contactors and disconnects.

   b. Arrange for single point electrical connection.

7. Condensate Pump:

   a. Provide external condensate pump with hard-wired electrical connection when required.

   b. Pipe drain to floor drain.

D. Outdoor Unit:

1. Description:

   a. Provide air-cooled heat pump (with heat recovery system for simultaneous heating and cooling) designed for outdoor installation with factory-supplied supports, properly assembled, and tested at the factory.

   b. Completely weatherproof and include compressor, condenser coils, condensing fans, motor, refrigerant reservoir, charging valve, controls, and a holding charge of refrigerant.

   c. Provide guards on condenser fans and coil guard. Power coated finish.

   d. Completely factory assembled, piped, wired, and tested.

e. Both refrigerant lines insulated between the outside and inside units.

f. Sound rating no higher than 63 dB(A).

g. Modular in design and allow for side-by-side installation with minimum spacing.

h. Provide accessories and kits required for a complete installation including field connection of heat pump units.

2. Cabinet: The casing(s) fabricated of galvanized steel, bonderized and finished with baked enamel.

3. Condenser Fans and Motors:

a. Direct driven variable speed propeller type fans with permanently lubricated motors.

b. Provide fans with a raised guard to prevent contact with moving parts.

c. Outdoor Unit: Vertical discharge airflow.

4. Refrigerant Circuits:

a. Units hold a charge of R410A refrigerant.

b. Include back seating service valve and gauge ports in liquid and suction lines.

c. Provided refrigerant filter-dryer.

d. Refrigeration circuit of the condensing unit consists of the following:

(1) Scroll Compressor

(2) Motors

(3) Fans

(4) Condenser Coil

(5) Electric Expansion Valve

(6) Solenoid Valves

(7) 4-Way Valve

(8) Distribution Headers

(9) Capillaries

(10) Filters

(11) Shut-Off Valves

(12) Oil Separators

(13) Service Ports

(14) Liquid Receivers

(15) Accumulators

5. Outdoor Coil: Nonferrous construction with lanced or corrugated plat fins on copper tubing.

6. Compressors:

a. Furnish inverter driven scroll hermetic sealed compressor isolation and sound muffling.

b. Overload and inherent winding thermostat protection to prevent burn out.

c. Provide crankcase heater.

d. Multiple compressors manifolded for single joint connection on liquid and suction lines.

e. Capacity completely variable down to 16 percent of rated capacity.

7. Controls:

a. Provide high and low pressure cutouts, contactors and internal overload protection on motors.

b. Provide low ambient operation to 0 degrees F outside to maintain condensing temperature on part load operation.

c. Provide short cycle timer.

8. Warranty: Provide 5 year warranty on compressors.

E. Branch Circuit Controller:

1. General:

a. Galvanized steel finish.

b. Completely factory assembled, piped, and wired.

c. Each unit run tested at the factory.

d. Mount indoors and operate so that different zones served by each controller can be in heating and cooling mode simultaneously.

2. Cabinet:

a. House a liquid-gas separator and multiple refrigeration control valves.

b. Contain tube-in-tube heat exchangers.

c. Casing: Fabricated of galvanized steel.

3. Refrigerant Valves:

a. Furnish unit with multiple two position refrigerant valves.

b. Circuit: Two-position liquid line valve and a two-position suction line valve.

c. When connecting a 54,000 BTU-h or larger indoor unit section, 2 branch circuits joined together at the branch controller to deliver an appropriate amount of refrigerant the two refrigerant valves operate simultaneously.

d. Linear electronic expansion valves used to control the variable refrigerant flow.

4. Integral Drain Pan: Provide integral condensate pan and drain.

5. Condensate Pump:

a. Provide internal factory-mounted condensate pump with hard-wired electrical connection.

b. Provide external condensate pump with hard-wired electrical connection when required.

c. Pipe drain to floor drain.

6. Electrical:

a. Furnish starters and contactors.

b. Arrange for single point electrical connection.

F. VRF Controls:

1. Provide a complete, control system with operating and safety controls, consisting of remote controllers and centralized controllers.

2. Network together using a high-speed communication bus and wiring as recommended by manufacturer.

3. Provide control wiring and control power wiring for a complete and operational system.

4. Provide required controllers for stand-alone temperature sensors.

5. Controls network to support operation monitoring, scheduling, error email distribution, personal browsers, and online maintenance support.

6. Room Thermostat:

   a. Provide locally programmable 7-day thermostats with automatic change over, fan on-auto switch, system off-auto switch, and individual set point for heating and cooling with backlit LCD display.

   b. Provide minimum of four independent programmable temperature periods per day.

   c. Provide error codes in the event of system abnormality/error.

   d. Provide one thermostat per unit unless otherwise indicated.

   e. Provide 10 percent spare stock to owner.

   f. Based on: Mitsubishi Deluxe MA Controller.

7. Room Thermostat:

   a. Ability to allow the user to change on/off, temperature setting, and fan speed setting.

   b. Provide display of a four-digit error code in the event of system abnormality/error.

   c. Provide one thermostat per unit unless otherwise indicated. Provide 10 percent spare stock to owner.

   d. Based on: Mitsubishi Simple MA Controller.

8. Centralized Controller:

   a. Capable of controlling a maximum of 50 indoor units with multiple outdoor units.

   b. Override remote controllers every 2 hours, system configuration, daily/weekly/annual scheduling, monitoring of operation status, error email notification, online maintenance tool, and malfunction monitoring.

   c. Provide basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or indoor units (collective batch operation) including on/off, operation mode selection (cool, heat, auto, dry, and fan), temperature setting, fan speed setting, airflow direction setting, error email notification, and online maintenance.

9. Power Supply: Provide power supply for controls from spare electrical circuits, including breakers, disconnects, transformers, and wiring.

10. Refer to Section 23 09 93, Sequence of Operations for HVAC Controls for required controls, control functions, and sequences of operation for controls.

G. Controls Interface:

1. Equip with network port and network type data transfer interface with the DDC controller.

2. The following interface required:

a. BACnet protocol compatible with the system specified in Section 23 09 00, Instrumentation and Controls for HVAC.

b. Alarms read to DDC controller.

c. The following analog signals read to the DDC controller as a minimum: Space temperature.

d. The following status signals be read to the DDC controller as a minimum:

(1) Occupied Cycle

(2) Unoccupied Cycle

(3) Warmup

(4) Override

(5) Supply Fan

(6) Compressors

(7) Heating/Cooling Operation

H. Controls Interface:

1. The packaged equipment controls equipped with a network port and network type data transfer interface with the system specified in Section 23 09 00, Instrumentation and Controls for HVAC.

2. Input and output points, setpoints and functions identified in the Sequences of Operation accessible to the DDC control system.

PART 3 EXECUTION

3.1 ROOFTOP MOUNTED AIR CONDITIONING UNIT AND HEAT PUMP

A. Installation:

1. Coordinate roof penetration with others.

2. Install curb.

3. Furnish 2-inch thick, 2 pcf density insulation along inside of curb. Installation per Section 23 07 00, Insulation for HVAC.

4. Install unit where shown, with air filters in place before operating unit. Comply with manufacturer’s recommendation.

5. Provide minimum of 3-inch trap seal on condensate drain connections.

6. Keep access door to roof mounted equipment closed to prevent wind and weather damage.

B. Start-Up:

1. General: Comply with manufacturer’s instructions.

2. Start-up of units provided under the direct supervision of the manufacturer’s representative with factory-trained personnel.

C. Testing and Adjusting/Performance Test:

1. Except where initial unit operation clearly shows the performance meets or exceeds the requirements, test to show compliance.

2. Perform tests by the manufacturer’s representative in the presence of the Engineer.

3.2 SPLIT-SYSTEM AIR CONDITIONING UNIT

A. Installation:

1. Install in location shown on the Drawings. Level unit and secure to structure.

2. Make piping connections and unit installation per manufacturer's recommendations and installation guides.

3. Size and run refrigerant piping between fan coil unit(s) and air-cooled condensing unit(s) per manufacturer's recommendations. Provide traps and double suction and/or discharge risers if recommended by the manufacturer.

4. Insulate refrigerant piping as specified in Section 23 07 00, Insulation for HVAC.

5. Pipe condensate pan to floor drain per manufacturers installation guide.

6. Make refrigerant piping connections, install refrigeration accessories, and charge system. Provide additional refrigerant as required for proper operation at design capacities.

B. Start-up:

1. General: Comply with manufacturer’s instructions.

2. Install filters before operating unit.

3. Insure proper refrigerant and airflow before operating unit compressor.

C. Provide interconnecting power and control wiring, routed in conduit from the outdoor unit to the indoor unit, and control panel thermostat. Where unit provided requires separate power connections to the indoor and outdoor units provide at no additional cost. Include branch circuit conduit, wiring, circuit breaker, terminations, etc. as required for complete system. Branch circuit serving indoor unit originates in same panelboard serving outdoor unit.

D. Testing and Adjusting/Performance Test: Except where initial unit operation clearly shows the performance meets or exceeds the requirements, test to show compliance. The manufacturer's representative in the presence of the Engineer to perform tests.

3.3 VARIABLE REFRIGERANT FLOW SYSTEM

A. Installation:

1. Install in location shown on the Drawings. Level unit and secure to structure. Provide secondary structural base where required to attached to structure. Provide vibration isolators where indicated.

2. Make piping connections and unit installation per manufacturer's recommendations and installation guides.

3. Size and run refrigerant piping between fan coil unit(s), branch circuit controller(s) and condensing unit(s) per manufacturer's recommendations.

4. Insulate refrigerant piping as specified in Section 23 07 00, Insulation for HVAC.

5. Pipe coil drain pan to floor drain per manufacturers installation guide.

6. Provide secondary drain protection via a sensor in the drain pain overflow. Field wire interlock to shut down the unit upon sensing of moisture.

7. Make refrigerant piping connections, install refrigeration accessories, and charge system. Provide additional refrigerant as required for proper operation at design capacities.

8. Provide interconnecting power and control wiring.

B. Controls:

1. Install controls.

2. Provide devices, materials, equipment, software, wiring, interconnecting power, labor, and engineering necessary to achieve a fully functioning system.

C. Start-up:

1. Comply with manufacturer's instructions. Startup checklist to be provided by the manufacturer and completed by the contractor prior to startup.

2. Startup to be witnessed and signed off on by the manufacturer's representative.

3. Install filters before operating unit.

4. Ensure proper refrigerant and airflow before operating unit compressor.

END OF SECTION

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes Design-Build work.

B. The intent of Division 26, Electrical Specifications and Drawings is to provide a complete and workable facility, with complete systems as required by applicable codes, as indicated, and as specified.

C. Include work specified in Division 26, Electrical and as indicated on Drawings. Include appurtenances, connections, fasteners, and accessories required to make a complete working system, whether indicated or not indicated.

D. Refer to Division 01, General Requirements.

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

1.3 REFERENCES

A. The latest adopted revisions of the publications listed below apply to these Specifications as referenced:

1. IBC International Building Code
2. NEC National Electrical Code
3. NFPA National Fire Protection Association
4. NEMA National Electrical Manufacturers Association
5. NECA National Electrical Contractors Association
6. ANSI American National Standards Institute
7. IEEE Institute of Electrical and Electronic Engineers
8. UL Underwriters Laboratories
9. OAR Oregon Administrative Rules

1.4 SYSTEM DESCRIPTION

A. Ground Systems:

1. Provide complete ground systems indicated.

2. Include conduit system, transformer housings, switchboard frame, and neutral bus, motors, and miscellaneous grounds required by Contract Documents and by applicable codes.

B. System Identification:

1. Clearly identify elements of the Project electrical system to indicate the loads served, or the function of each item of equipment, connected under this work.

2. Comply with requirements of Division 26, Electrical, and with applicable codes.

C. Drawings:

1. Drawings are diagrammatic. They do not show every offset, bend, tee, or elbow, which may be required to install work in the space, provided and avoid conflicts with other construction.

a. Prior to installing work, take field dimensions, and note conditions available for, installation.

b. Follow the Drawings as closely as practical to do so, and install additional bends, offsets, and elbows where required by installation conditions.

(1) Additional offsets, bends, and other connectors are subject to approval by Project Engineer.

(2) Install additional offsets, bends, and other connectors without additional cost to Owner.

c. The right to make any reasonable changes in outlet location prior to roughing in is reserved to the Owner's Representative.

2. Luminaire Designations:

a. Lower case letters adjacent to devices or luminaires indicate switching arrangement or circuit grouping.

b. Numbers adjacent to devices indicate circuit connection.

3. Circuits and Switching:

a. Do not change branch circuiting and switching indicated; nor combine homeruns, without Engineer's prior approval.

b. Do not combine or change feeder runs.

4. Circuit Conductors:

a. Cross or hash marks on conduit runs indicate quantity of No. 12 copper branch circuit conductors, unless otherwise noted.

b. Where such marks do not appear, provide quantity of circuit conductors to the outlets shown to perform the control or circuiting indicated.

c. Include ground, travelers, and switch legs required by the circuiting arrangement indicated.

d. Provide a dedicated neutral conductor with each circuit. Do not use a shared neutral conductor between phases unless, requested or directed.

1.5 SUBMITTALS

A. Comply with Division 01, General Requirements.

B. Contractor Responsibilities:

1. Submit submittals one time and in proper order.

2. Ensure equipment will fit in the space provided.

3. Deviations from the Drawings and Specifications specifically noted in the submittals. Failure to comply will automatically void any implied approval for use of the equipment on this project.

C. Shop Drawings and Equipment Data:

1. Combine electrical shop drawings and equipment data in Submittal binders.

2. Include in Submittal binders:

a. Complete index of materials and equipment as required by Specifications to be documented by submittals.

b. Fully describe equipment furnish per manufacturer's detailed specifications.

c. All deviations from the Drawings and Specifications, noted on the submittals. Failure to comply will automatically void any implied approval for use of the equipment on this project.

D. Installation Drawings:

1. Submit prior to starting installation.

2. Show outlets, devices, terminal cabinets, conduits, wiring, and connections required for the complete system described.

E. Record Drawings:

1. Keep record drawings up to date as the work progresses.

2. Show changes, deviations, addendum items, change orders, corrections, and other variations from the Contract Drawings.

3. Keep record drawings at the jobsite and available for the Architect's review.

4. At the completion of the work, incorporate all deviations from the installation drawings to indicate as-built conditions.

F. Operation and Maintenance Data:

1. As specified in Division 01, General Requirements.

2. Provide a separate manual or chapter for each system as follows:

a.

b. Fire Alarm System

c. Lighting System

d. Lighting Control System

3. Description of system.

4. Operating Sequence and Procedures:

a. Step-by-step procedure for system start-up, including a pre-start checklist.

(1) Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.

b. Detailed instruction in proper sequence, for each mode of operation (i.e., day-night, staging of equipment).

c. Emergency Operation:

(1) If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under those conditions.

(2) Include here only those alternate methods of operations (from normal) which the operator can follow when there is a partial failure or malfunctioning of components or other unusual condition.

d. Shutdown Procedure:

(1) Include instructions for stopping and securing the equipment after operation.

(2) If a particular sequence is required, give step-by-step instructions in that order.

5. Preventive Maintenance:

a. Schedule for preventive maintenance.

(1) State the recommended frequency of performance of each preventive maintenance task such as cleaning, inspection, and scheduled overhauls.

b. Cleaning: Provide instructions and schedules for all routine cleaning and inspection with recommended lubricants.

c. Inspection: If periodic inspection of equipment is required for operation, cleaning, or other reasons, indicate the items to be inspected and give the inspection criteria.

d. Provide instructions for lubrication and adjustments required for preventive maintenance routines. Identify test points and given values for each.

6. Manufacturers' Brochures:

a. Include manufacturers' descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views, and renewal parts lists.

b. Clearly define manufacturers' standard brochures so that the information applying to the actual installed equipment.

7. Results of performance testing, as specified in PART 3 of this Section.

G. Submittals Procedures:

1. Review and recommendations by the Architect or Engineer are not to be construed as change authorizations.

2. Either if discrepancies are discovered between the materials or equipment submitted, and the Contract Documents, prior to or after the data is processed, the Contract Documents govern.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Products and equipment comply with Oregon Revised Statute (ORS) 453.005(7)(e) prohibiting pentabrominated, octabrominated, and decabrominated diphenyl ethers. Where products or equipment within this specification contains these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.

2. Provide work and materials conforming to:

a. Local and State codes.

b. Federal and State laws and regulations.

c. Other applicable laws and regulations.

3. Obtain and pay for all permits, licenses, and inspection certificates required by authorities having jurisdiction.

4. Pay any other fees required by governing authorities for work of this Division.

B. Install only electrical products listed by a recognized testing laboratory or approved in writing by the local inspection authority as required by governing codes and ordinances.

1.7 SITE VISITATION

A. Visit the site prior to bidding and become familiar with existing conditions and other factors which may affect the execution of the work. Complete coordination of installation of equipment with prior bid packages previously issued. Include related costs in the initial bid proposal.

1.8 COORDINATION

A. Coordinate Work of This Division with all other trades to ensure proper installation of electrical equipment.

1. Review Drawings of other trades or crafts to avoid conflicts with cabinets, counters, equipment, structural members, and other possible impediments to electrical work.

2. Report potential conflicts to the Architect prior to rough-in.

3. Proceed with rough-in following Architect's directives to resolve conflicts.

4. Architectural Drawings govern.

B. Verify the physical dimension of each item of electrical equipment to fit the available space. Contractor's responsibility includes:

1. Coordination of the equipment to fit into the available space.

2. Access routes through the construction.

C. Layout Drawings:

1. Equipment arrangement shown on Drawings is diagrammatic to indicate general equipment sizing and spatial relationship. Include, as part of distribution equipment submittal, a scaled floor plan, which includes equipment shown with their submitted sizes. Include all feeder conduit routing, both aboveground and underground, including termination points at equipment. Submit for Engineer's review prior to commencing work.

2. Provide additional wiring details at switchboards, motor control centers, and other areas where work is of sufficient complexity to warrant additional detailing for coordination.

3. Submit layout drawings for approval prior to commencing field installation.

D. Where electrical connections are required for equipment provided as Work of other Divisions, coordinate rough in and wiring requirements for that equipment with its supplier and installer prior to commencing work. Notify Architect and Engineer of any discrepancies between the actual rough in and wiring requirements, and those identified on Drawings for resolution prior to installation.

E. Arrange raceways, wiring, and equipment to permit ready access to switches, motors, and control components.

1. Keep doors and access panels clear.

F. Coordinate electrical, telephone, and other utility services with the appropriate serving utility.

1. No additional compensation will be allowed the Contractor for connection fees or additional work or equipment required by the serving utility, but not covered in the Drawings or Specifications.

G. Coordinate underground work with other contractors working on the site.

1. Coordinate particularly with contractors installing storm sewer, sanitary sewer, water, and irrigation lines to avoid conflicts.

2. Common trenches may be used with other trades, providing clearances required by codes and ordinances are maintained.

H. Coordinated Shop Drawings.

1. Prepare in two-dimensional format.

1.9 CHANGE ORDERS

A. Supplemental cost proposals by the Contractor accompanied with a complete itemized breakdown of labor and materials. At the Architect's request, make available estimating sheets for the supplemental cost proposals. Separate and allocate labor for each item of work.

1.10 WARRANTY

A. Provide a written warranty covering the work of this Division as required by the General Conditions.

1. Incandescent Lamps: Excluded from this warranty.

B. Apparatus:

1. Free of defects of material and workmanship and in accord with the Contract Documents.

2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.

3. Operate at full capacity without objectionable noise or vibration.

C. Include in Contractor's warranty for Work of Division 26, Electrical system damage caused by failures of any system component.

PART 2 PRODUCTS

2.1 GENERAL

A. Where specified materials or methods conflict with applicable codes, the more stringent requirement applies.

B. Provide apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.

C. Ensure that entire electrical system operates at full capacity without objectionable noise or vibration.

D. Materials and Equipment:

1. Use materials and equipment that are:

a. New

b. Quality meeting or exceeding specified standards.

c. Free of faults and defects.

d. Conforming to Contract Documents.

e. Of size, make, type, and quality specified.

f. Suitable for the installation indicated.

g. Manufactured in accordance with NEMA, ANSI, UL, or other applicable standards.

h. Otherwise as specified in Division 01, General Requirements.

2. Equipment not meeting all requirements will not be acceptable, even though specified by name.

3. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer.

a. Component parts of the entire system need not be products of same manufacturer.

4. Basis of Design:

a. Consider the Basis of Design equipment scheduled or specified by performance or model number.

b. If other equipment is provided in lieu of the Basis of Design equipment, assume responsibility for all changes and costs which may be necessary to accommodate this equipment, including, but not limited to:

(1) Different sizes and locations for connections.

(2) Different dimensions.

(3) Different access requirements.

(4) Other differences.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:

1. Provide a complete properly operating system for each item of equipment specified.

2. Install materials in a neat and professional manner.

3. Comply with equipment manufacturer's written instructions, the best industry practices, and the Contract Documents.

4. Comply with latest published NECA Standard of Installation and provide competent supervision.

B. Clarification:

1. Where there is a conflict among manufacturer's instruction, best practice, and the Documents, request clarification from the Architect prior to rough-in.

2. Architect's decision will be final.

3. Remove and correct work installed without clarification at no cost to the Owner.

C. Existing concrete, block, or brick walls are considered not accessible and may require use of Surface Mounted Raceway (SMR) if existing concealed raceway and device boxes are not available for reuse or do not meet the intent of the design (i.e., proximity to egress path, point of use, etc.). Coordinate route and installation where SMR is required with the Architect/Engineer prior to rough-in. Responsible for reinstalling SMR routed without such prior approval to the Architect's satisfaction.

D. Existing stud walls (wood or metal) with or without blocking with plaster, plasterboard, or paneling finish are considered accessible with accessible ceiling, attic, tunnel, or crawl space above, below, or adjacent. Remove, patch, and repair finished surface as required to conceal rough in for new device locations. If it is determined that a specific instance will not permit concealment of rough-in due to obstructions such as beams, headers, and other structural elements, prior approval before rough-in from the Architect is required.

3.2 INSTALLATION IN RATED CONSTRUCTION

A. Install intumescent material around ducts, conduits, and other electrical elements penetrating rated construction.

B. Comply with firestop materials manufacturer written instructions to prevent spread of smoke or fire through sleeves or block-outs penetrating rated fire barriers.

C. Provide firestop materials specified in Division 07, and as follows:

1. Capable of passing a 3-hour test per ASTM E-814 (UL 1479).

2. Consisting of material capable of expanding nominally eight times when exposed to temperatures of 250 degrees F-350 degrees F.

3. An alternate method utilizing intumescent materials in caulk or putty complying with Division 07, Thermal and Moisture Protection Section, “Through-Penetration Firestop Systems” may be used.

3.3 EXCAVATION AND BACKFILL

A. Perform all necessary excavation and backfill for the installation of electrical work in compliance with Division 31, Earthwork.

B. Direct Burial Cable or Non-Metallic Conduit:

1. Minimum 3-inch cover of sand or clean earth fill placed around the cable or conduit on a leveled trench bottom.

2. Lay steel conduit on a smooth level trench bottom, so that contact is made for its entire length.

3. Where the electrical conduit is being laid, remove water from trench.

C. Place backfill in layers not exceeding 8-inches deep and compact to 95 percent of maximum density at optimum moisture to preclude settlement.

1. Interior: Bank sand or pea gravel.

2. Exterior: Excavated material with final 8-inches clean soil.

D. Following backfilling, grade all trenches to the level of surrounding soil. Dispose excess soil at the site as directed.

E. Provide 6-inches wide vinyl tape marked ELECTRICAL in backfill, 12-inches below finished grade, above all high voltage cable or conduit runs.

F. Coordinate patching of all asphalt or concrete surfaces disturbed by this work with General Contractor.

3.4 NOISE CONTROL

A. Minimize transmission of noise between occupied spaces.

B. Outlet Boxes:

1. Do not install outlet boxes on opposite sides of partitions back to back.

2. Do not use straight through outlet boxes, except where indicated.

C. Conduit:

1. Route conduit along corridors or other “noncritical” space to minimize penetrations through sound rated walls, or through non-sound-rated partitions between occupied spaces.

2. Grout solid and airtight all penetrations through sound rated partitions.

3. Use flexible connections or attachments between independent wall structures.

a. Do not rigidly connect (i.e., bridge) independent wall structures.

D. Do not install contactors, transformers, starters, and similar noise-producing devices on walls that are common to occupied spaces, unless otherwise indicated.

1. Where such devices are indicated to be mounted on walls common to occupied spaces, use shock mounts, or otherwise isolate them to prevent the transmission of noise to the occupied spaces.

E. Ballasts, contactors, starters, transformers, and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

3.5 EQUIPMENT CONNECTIONS

A. General:

1. Provide complete electrical connections for all items of equipment requiring such connections, including incidental wiring, materials, devices, and labor necessary for a finished working installation.

2. Verify the location and method for connecting to each item of equipment prior to roughing-in.

3. Check the amperage, maximum overcurrent protection, voltage, phase, and similar attributes of each item of equipment before rough in and connection.

B. Motor Connections:

1. Make motor connections for the proper direction of rotation.

2. Minimum Size Flex for Mechanical Equipment: 1/2-inch; except at small control devices where 3/8-inch flex may be used.

3. Exposed Motor Wiring: Jacketed metallic flex with minimum 6-inches slack loop.

4. Do not test run pump motors until liquid is in the system.

C. Control devices and wiring relating to the HVAC systems are furnished and installed under Division 23, HVAC; except for provisions or items indicated in Division 26, Electrical Drawings and Specifications.

3.6 EQUIPMENT SUPPORT

A. Minimum Support Capacity:

1. Provide fastening devices and supports for electrical equipment, luminaires, panels, outlets, and cabinets capable of supporting not less than four times the ultimate weight of the object or objects fastened to or suspended from the building structure.

B. Luminaire Supports:

1. Support luminaires from the building structure.

2. Use supports that provide proper alignment and leveling of luminaires.

3. Where permitted at exposed luminaires, install flexible connections neat and straight, without excess slack, and attached to the support device.

C. Support all junction boxes, pull boxes, or other conduit terminating housings located above the suspended ceiling from the floor above, roof, or penthouse floor structure to prevent sagging or swaying.

D. Conduits:

1. Support suspended conduits 1-inch and larger from the overhead structural system with metal ring or trapeze hangers and threaded steel rod having a safety factor of four.

2. Conduits smaller than 1-inch installed in ceiling cavities, may be supported on the mechanical system supports when available space and support capacity has been coordinated with the subcontractor installing the supports.

3. Anchor conduit installed in poured concrete to the steel reinforcing with No. 14 black iron wire.

E. Powder actuated or similar shot-in fastening devices will not be permitted for any electrical work except by special permission from the Architect.

3.7 ACCESS DOORS

A. Location and size of access doors is Work of Division 26, Electrical.

B. Furnishing and installation of access doors is work of Division 08, Openings.

3.8 ALIGNMENT

A. Install panels, cabinets, and equipment level and plumb, parallel with structural building lines.

B. Install distribution equipment and electrical enclosures fitted neatly, without gaps, openings, or distortion.

C. Properly and neatly, close unused openings with approved devices.

D. Fit surface panels, devices, and outlets with neat, appropriate, trims, plates, or covers without overhanging edges, protruding corners, or raw edges.

3.9 CUTTING AND PATCHING

A. General:

1. Comply with Division 01, General Requirements.

2. Restore to original condition new or existing work cut or damaged by installation, testing, and removal of electrical Work.

3. Patch and finish spaces around conduits passing through floors and walls to match the adjacent construction, including painting or other finishes.

4. Clean up and remove all dirt and debris.

B. Make additional required openings by drilling or cutting. Use of jackhammer is prohibited.

C. Cut oversize fill holes so that a tight fit is obtained around the objects passing through.

1. In rated construction, comply with Division 07, Thermal and Moisture Protection.

D. Obtain Architect's permission and direction prior to piercing beams or columns.

E. Where alterations disturb lawns, paving, walks, and other permanent site improvements, repair and refinish surfaces to condition existing prior to commencement of work.

3.10 PROTECTION OF WORK

A. Protect electrical work and equipment installed under this Division against damage by other trades, weather conditions, or any other causes.

1. Equipment found damaged or in other than new condition will be rejected as defective.

B. Keep switchgear, transformers, panels, luminaires, and electrical equipment covered or closed to exclude dust, dirt, and splashes of plaster, cement, paint, or other construction material spray.

1. Equipment not free of contamination is not acceptable.

C. Provide enclosures and trims in new condition, free of rust, scratches, and other finish defects.

1. If damaged, properly refinish in a manner acceptable to the Architect.

3.11 UNINTERRUPTED SERVICE

A. Maintain electrical service to all functioning portions of the building throughout construction.

B. Pre-arrange with Owner outages necessary for new construction.

1. Comply with Division 01, General Requirements.

2. Apply for scheduled shutdowns minimum 4 weeks prior to time needed and reconfirm a minimum of 72 hours prior to time needed.

3. Contractor is liable for any damages resulting from unscheduled outages or for those not confined to the pre-arranged times. Damages include costs incurred by the Owner and by the Owner's tenants.

C. Maintain signal and communication systems and equipment in operation at all times.

1. Outages of these systems shall be treated the same as electrical power outages.

D. Maintain telephone services in accordance with Division 01, General Requirements.

3.12 DEMOLITION AND SALVAGE

A. General:

1. Remove or relocate all electrical wiring, equipment, luminaires, etc., as may be encountered in removed or remodeled areas in the existing construction affected by this work.

2. Disconnect electrical service to hard-wired equipment scheduled for removal under other Divisions of Work.

3. Wiring which serves usable existing outlets restored and routed clear of the construction or demolition.

4. Safely cut off and terminate wiring abandoned and removed to leave site clean.

B. Reuse of Existing:

1. Existing concealed conduits in good condition may be reused for installation of new wiring where available.

2. Existing undamaged, properly supported surface conduits may be reused where surface conduits are called for, if the installation meets all workmanship requirements of the Specifications.

3. Where new wiring is added or existing wiring disturbed in existing branch circuit raceways, existing wires replaced with new.

C. Salvage and Disposal:

1. Removed materials, not containing hazardous waste, not scheduled for reuse shall become the property of the Contractor for removal from the site, except for those items specifically indicated on the Demolition Drawings for salvage or reuse.

2. Materials containing, or possibly containing, hazardous waste identified for removal and disposal by the Owner’s Hazardous Waste Contractor.

3. Neatly store salvaged items at one location at the site where directed by the Owner’s Representative.

4. Salvage properly operating circuit breakers from panels scheduled for removal and use to replace faulty or inadequate breakers in existing panels scheduled to remain.

3.13 WIRING IN PRECAST CONSTRUCTION

A. Coordinate installation of electrical conduit, boxes, fittings, anchors, and miscellaneous items concealed in precast concrete assemblies with the General Contractor.

B. Where electrical items are required to be installed in concrete assemblies precast off-site, it will be the Electrical Contractor's responsibility to place the electrical items necessary in the concrete at the off-site locations or pay for the General Contractor to make arrangements for the installation of these items in the precast assemblies. Electrical Contractor held responsible for the proper placement and locations of electrical items at the off-site location.

3.14 COMPLETION AND TESTING

A. General:

1. Comply with Division 01, General Requirements.

B. Upon completion, test systems to show that installed equipment operates as designed and specified, free of faults and unintentional grounds.

1. Schedule system tests so that several occur on the same day.

2. Coordinate testing schedule with construction phasing.

3. Conduct tests in the presence of the Architect or its representative.

4. Notify Architect of tests 48 hours in advance.

C. Engage a journeyman electrician with required tools to conduct equipment tests. Arrange to have the equipment factory representative present for those tests where the manufacturer's warranty could be impacted by the absence of a factory representative.

D. Perform tests per the requirements of each of the following systems:

1. Lighting System

2. Lighting Control System

E. Provide a written record of performance tests and submit with operation and maintenance data.

END OF SECTION

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Conductors - 600V
2. Power Limited Wiring
3. Conductors - Fire Pump Circuits
4. MC Branch Circuit Cable
5. Connectors - 600V and Below

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 26, Grounding and Bonding for Electrical Systems

D. Section 26 05 33, Raceways and Boxes for Electrical Systems

E. Section 26 05 53, Identification for Electrical Systems

F. Section 26 05 80, Electrical Testing

1.3 REFERENCED STANDARDS

A. ASTM: American Society For Testing and Materials:

1. ASTM B 3 Soft or Annealed Copper Wire
2. ASTM B 8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
3. ASTM B 33 Tinned Soft or Annealed Copper Wire for Electrical Purposes

B. ICEA: Insulated Cable Engineers Association:

1. S-95-658 Non-shielded 0-2 kV Cables

C. IEEE: Institute of Electrical and Electronic Engineers:

1. IEEE 383 Type Test of Class IE Electric Cables, Field Splices, and Connections

D. UL: Underwriters Laboratories:

1. UL 44 Rubber-Insulated Wires and Cables

2. UL 83 Thermoplastic-Insulated Wires and Cables

3. UL 1277 Type TC Power and Control Tray Cable

1.4 SUBMITTALS

A. Submit product data for the following materials:

1. Single conductor 600V power and control conductors.

2. Fire Pump Cable

3. MC Cable

B. Submittals of the following materials consist only of a listing of the manufacturer's name and the applicable catalog numbers of the items to be utilized.

1. Connectors

2. Branch Circuit Conductor Splices

3. Splices with Compression Fitting and Heat-Shrinkable Insulator

C. Submit cable test data per testing requirements of PART 3.

1.5 QUALITY ASSURANCE

A. Copper Conductors. Indicated sizes considered minimum for ampacities and voltage drop requirements.

B. Conductors for special systems as recommended by the equipment manufacturer except as noted.

C. Deliver conductors to the job site in cartons, protective covers, or on reels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Conductors - 600V:

1. General

2. Essex

3. Southwire

4. Or equivalent.

B. Conductors - Fire Pump Circuits:

1. Pryotenax

C. MC Branch Circuit Cable:

1. AFC Cable Systems
2. Southwire
3. Okonite

D. Connectors - 600V and Below:

1. Burndy
2. Anderson
3. Or equivalent.

2.2 CONDUCTORS – 600V

A. Type:

1. Copper: 12 AWG minimum size unless noted otherwise. 12 AWG and 10 AWG, solid or stranded, 8 AWG or larger, Class B concentric or compressed stranded.
2. Aluminum: Not allowed.
3. Conductors with continuous colored jackets are acceptable; refer to color-coding in PART 3.
4. Conductors with manufacturers no lube continuous jacket coatings are acceptable.

B. Insulation:

1. THHN/THWN-2 for conductors 6 AWG and smaller.
2. XHHW-2 for conductors 4 AWG and larger.

C. Thru wiring in fluorescent luminaires rated for 90 degree C minimum.

2.3 POWER LIMITED WIRING

A. Copper, stranded or solid as recommended by the system manufacturer.

B. Insulation appropriate for the system and location used.

2.4 MC BRANCH CIRCUIT CABLE

A. Sheath:

1. Steel or Aluminum, of the interlocking metal type, continuous and close fitting.
2. Sheath not considered a current carrying or grounding conductor.

B. Conductors:

1. Solid copper, of the same ampacity as the conduit/wire system indicated for the specific location.

2. Provide separate green insulated grounding conductors in circuits where an isolated ground is called for.

C. Provide HCF rated cable for health care facility construction as code required.

D. Feeder style MC Cable with steel or aluminum armor for feeders greater than 100A.

2.5 CONNECTORS – 600V AND BELOW

A. Branch Circuit Conductor Splices:

1. Live spring type, Scotchlok, Ideal Wire Nut, Buchanan B-Cap, or 3M Series 560 self-stripping type.

B. Cable Splices:

1. Compression tool applied sleeves, Kearney, Burndy, or equivalent with 600V heat shrink insulation.

2. Submit proposed splice location to the Engineer for review, except where indicated on the plans

C. Terminator Lugs for Stranded Wire:

1. 10 AWG Wire and Smaller: Spade flared, tool applied.

2. 8 AWG Wire and Larger: Compression tool applied.

3. Setscrew type terminator lugs furnished as an integral part of distribution equipment, switches and circuit breakers will be acceptable.

PART 3 EXECUTION

3.1 CONDUCTORS

A. Pulling compounds may be used for pulling conductors. Clean residue from the conductors and raceway entrances after the pull is made.

B. Pulleys or Blocks:

1. Use for alignment of the conductors when pulling.

2. Pulling in accordance with manufacturer’s specifications regarding pulling tensions, bending radii of the cable, and compounds.

C. Make up and insulate wiring promptly after installation of conductors. Do not pull wire in until bushings are installed and raceways terminations are completed. Do not pull wire into conduit embedded in concrete until after the concrete poured and forms stripped.

D. Provide a dedicated neutral conductor with each branch circuit, do not use a shared neutral conductor between phases unless specifically requested or directed.

E. For remodel work or where shared neutrals are used by equipment such as systems furniture, provide a breaker handle tie as required for the phases sharing the neutral conductor.

3.2 MC CABLE

A. Allowed only where concealed within wall or ceiling cavities.

B. Do not use as branch circuit homeruns to branch panelboards.

C. Terminate MC cabling within a local junction box and transition to conduit and building wire homerun back to panelboard within the room or as soon as possible.

D. Locate junction box within one of the following spaces:

1. Ceiling space

2. Other accessible area of the room

3. Immediate area where MC cabling is servicing devices.

E. EMT or RMC conduit utilized for branch circuit homeruns to branch panelboards.

F. Provide enclosures and terminals to transition from MC Cable to building wire as required.

3.3 CONNECTORS

A. Terminate control and special systems with a tool applied spade flared lug when terminating at a screw connection.

B. Screw and bolt type connectors made up tight and retightened after an 8 hour period.

C. Apply tool applied compression connectors per manufacturer’s recommendations and physically checked for tightness.

3.4 COLOR CODING

A. Color code secondary service, feeders, and branch circuit conductors. Phase color code to be consistent at feeder terminations, A-B-C left-to-right, A-B-C top-to-bottom, or A-B-C front-to-back. Color code is as follows:

120/240V 208Y/120V	Phase	480V 480Y/277V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray*
Green	Ground**	Green
* or white with colored (other than green) tracer		
**Ground for isolated ground receptacles green with yellow tracer.		

B. Use solid color compound or solid color coating for 12 AWG and 10 AWG branch circuit conductors and neutral sizes.

C. Phase conductors 8 AWG and larger color code using one of the following:

1. Solid color compound or solid color coating.

2. Stripes, bands, or hash marks of color specified above.

3. Colored as specified using 3/4-inch wide tape. Apply tape in half overlapping turns for a minimum of three inches for terminal points and in junction boxes, pull boxes, troughs, manholes, and handholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Apply tags to cable stating size and insulation type where cable markings are tape covered.

D. Switch legs, travelers, etc., consistent with the phases to which, connected or a color distinctive from that listed.

E. Color-coding of the flexible wiring system conductors and connectors.

F. For modifications and additions to existing wiring systems, color-coding conform to the existing wiring system.

3.5 FIELD TESTING

A. 600V Rated Conductors: Test for continuity. Conductors 100A and over in meggered after installation and prior to termination. Provide the megger, rated 1,000V DC, and record and maintain the results, in tabular form, clearly identifying each conductor tested.

1. Replace cables when test value is less than 1 megohms.

2. Cable test submittal include results, equipment used, and date.

END OF SECTION

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Ground Conductors

2. Connectors

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 33, Raceways and Boxes for Electrical Systems

E. Section 26 05 80, Electrical Testing

F. Section 26 27 26, Wiring Devices

1.3 QUALITY ASSURANCE

A. Provide complete ground systems as indicated. Include conduit system, transformer housings, switchboard frame and neutral bus, motors, and miscellaneous grounds required.

B. Provide 600V insulated main bonding jumper for utility company connection between ground bus in switchgear lineup and ground termination point or service ground in transformer vault as directed by the utility.

C. Provide an insulated ground conductor in every conduit or raceway containing power conductors.

D. Continue existing system as specified herein and shown on the Drawings.

PART 2 PRODUCTS

2.1 GROUND CONDUCTORS

A. Green insulated copper for use in conduits, raceways, and enclosures.

2.2 CONNECTORS

A. Cast, set screw, or bolted type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Grounding Conductors: Sized in accordance with Article 250, Tables 250.66 and 250.122 of the National Electrical Code.

B. Grounding Conductor Connectors: Make up tight, located for future servicing, and ensure low impedance.

C. Ground the electrical system, the cold-water service, structural steel, and transformers to the building ground grid.

D. Plug-in Receptacles: Bonded to the boxes, raceways, and grounding conductor.

3.2 EQUIPMENT

A. Provide separate green insulated equipment ground conductor in non-metallic and flexible electrical raceways.

B. Ground luminaires, panels, controls, motors, disconnect switches, exterior lighting standards, and noncurrent carrying metallic enclosures. Use bonding jumpers, grounding bushings, lugs, buses, etc., for this purpose.

C. Provide grounding bushings on feeder conduit entrances to panels and equipment enclosures and bond bushings to enclosures with minimum 10 AWG conductor. Connect the equipment ground to the building system ground. Use the same size equipment ground conductors as phase conductors, up through 10 AWG.

END OF SECTION

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Hangers
2. Pipe Straps
3. Support of Open Cabling

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 33, Raceways and Boxes for Electrical Systems

D. Section 26 50 00, Lighting

1.3 REFERENCED STANDARDS

A. International Building Code (IBC)

B. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

PART 2 PRODUCTS

2.1 HANGERS

A. Kindorf B-905-2A Channel, H-119-D washer, C105 strap, minimum 1/2-inch rod with ceiling flange, or equal.

2.2 PIPE STRAPS

A. Two-hole galvanized or malleable iron.

2.3 SUPPORT OF OPEN CABLING

A. Support of Open Cabling: Label NRTL for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.

1. Support brackets with cable tie slots for fastening cable ties to brackets.
2. Lacing bars, spools, J-hooks, and D-rings.
3. Straps and other devices.

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide electrical equipment supports.

B. Install vertical support members for equipment, straight and parallel to building walls.

C. Provide independent supports to structural member for electrical fixtures, materials, or equipment installed in or on ceiling, walls, or in void spaces and/or over furred or suspended ceilings.

D. Do not use other trades' fastening devices to support electrical equipment materials or fixtures.

E. Do not use supports and/or fastening devices to support other than one particular item.

F. Support conduits within 18-inches of outlets, boxes, panels, cabinets, and deflections.

G. Provide complete seismic anchorage and bracing for the vertical and lateral restraint of conduit, cable trays, bus ducts, and electrical equipment as required by IBC Chapter 6 and the most recent version of the SMACNA Seismic Restraint Manual for Seismic Hazard Level (SHL) A. Submit shop drawings of bracing systems to the Architect for review and bear the seal of a professional engineer registered in the State of Oregon.

3.2 LUMINAIRES

A. Light-Duty Ceiling Systems:

1. Attach 12 gauge hanger wire from each corner of the luminaire to the structure above.

2. Positively and securely, attach luminaire within 6-inches of each corner to the suspended ceiling-framing member by mechanical means.

B. Intermediate-Duty Ceiling Systems:

1. Positively and securely, attach luminaire within 6-inches of each corner to the suspended ceiling-framing member by mechanical means.

2. Attach 12 gauge hanger wire within 3-inches of each corner of each luminaire.

3. Connect two 12 gauge slack wires from the luminaire housing to the structure above for luminaires weighing less than 56 pounds.

4. Support luminaries weighing 56 pounds or more directly from the structure above with approved hangers attached to each corner of the luminaire.

C. Heavy-Duty Ceiling Systems:

1. Positively and securely, attach luminaire within 6 inches of each corner to the suspended ceiling-framing member by mechanical means.

2. Connect two 12-gauge slack wires from the luminaire housing to the structure above for luminaires weighing less than 56 pounds.

3. Support luminaries weighing 56 pounds or more directly from the structure above with approved hangers attached to each corner of the luminaire.

3.3 PULL AND JUNCTION BOXES

A. Pull and junction boxes installed within the cavity of a suspended ceiling that is not a fire rated assembly may be attached to the suspended ceiling framing members, provided the following criteria are met:

1. Installation complies with the ceiling system manufacturer's instructions.

2. Pull or junction box is not larger than 100 cubic inches.

3. Support to the main runner with two fastening devices designed for framing member application and positively attach or lock to the member.

4. Serves branch circuits and associated equipment in the area.

5. Pull or junction box is within 6-feet of the luminaires supplied.

6. Framing members are not rotated more than 2 degrees after installation.

7. Install within the cavity of a suspended ceiling may be attached to independent support wires, provided the following criteria are met:

a. Independent support wires are taut and connected at both ends, one end to the ceiling framing member and the other to the structure above.

b. No larger than 100 cubic inches.

c. Secure to the independent support wires by two fastening devices designed for the application.

d. Independent support wires in a fire-rated ceiling are distinguishable by color, tagging, or other effective means.

3.4 CABLES AND RACEWAY

A. Cables and raceway installed within the cavity of a suspended ceiling may be attached to independent support wires provided the following criteria are met:

1. Independent support wires are taut and connected at both ends, one end to the ceiling framing member and the other to the structure above.

2. Raceways no larger than 1-inch trade size and cables and bundled cables are not larger than 1-inch diameter including insulation.

3. Not more than three raceways or cables supported by independent support wire and supported within the top or bottom 12-inches.

4. Cables for telecommunications, data processing, Class 2 power-limited signaling systems, fiber optics, and other power limited systems are securely fastened within 2 feet of each termination and at intervals not to exceed 5-feet or per the manufacturer's installation instructions.

5. Secure raceways at intervals required for the type of raceway installed.

6. Secure cables and raceway to independent support wires by fastening devices and clips designed for the purpose.

7. Independent support wires are distinguishable by color, tagging, or other effective means.

B. Cables and raceway installed within the cavity of a suspended ceiling may be supported with trapezes constructed of steel rods and channels provided the following criteria are met:

1. The size of the rods, channel, and fastening devices are suitable for the anticipated weight.

2. The spacing of the trapezes meets that required for the type of raceway installed.

3. Secure to a trapeze by straps designed for the purpose.

4. Cables and raceway do not support other raceway or cables.

5. An appropriately sized seismic bracing system is installed.

END OF SECTION

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Metallic Conduits
2. Non-Metallic Conduits
3. Wireways
4. Fittings
5. Metallic Boxes
6. Floor Boxes

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 26, Grounding and Bonding for Electrical Systems

E. Section 26 05 29, Hangers and Supports for Electrical Systems

F. Section 26 05 53, Identification for Electrical Systems

PART 2 PRODUCTS

2.1 GENERAL

A. Raceways and conduits of specified types for electrical system wiring, except where clearly indicated otherwise.

B. Fittings, boxes, hangers, and appurtenances required for the conduits and raceways.

C. Size raceways and conduits as indicated. Where no size indicated, conduit may be the minimum code permitted size for the quantity of conductors installed, based upon NEC tables for conductors with type THW insulation.

2.2 METALLIC CONDUITS

A. Rigid Metal Conduit (RMC):

1. Smooth surfaced heavy wall mild steel tube of uniform thickness and temper, reamed and threaded at each end and protected inside and out with galvanizing, sherardizing, or equivalent process.

2. Comply with NEC Article 344.

B. Intermediate Metallic Conduit (IMC):

1. Smooth surface, intermediate wall mild steel tube of uniform thickness and temper, reamed and threaded at each end, and protected inside and out with galvanizing, sherardizing, or equivalent process.

2. Comply with NEC Article 342.

C. Electrical Metallic Tubing (EMT):

1. Smooth surface, thin wall mild steel tube of uniform thickness and temper, galvanized or sherardized on the outside, and enameled on the interior.

2. Comply with NEC Article 358.

D. Flexible Conduits (Flex):

1. Flexible Metallic Conduit:

a. Interlocking single strip steel construction, galvanized inside and out after fabrication.

b. Comply with NEC Article 348.

2. Liquid Tight:

a. Similar to flexible metallic conduit, except encased in a liquid tight polyvinylchloride or equivalent outer jacket over the flexible steel core.

b. Comply with NEC Article 350.

2.3 NON-METALLIC CONDUITS

A. Rigid Non-Metallic Conduit:

1. Type II PVC Schedule 40 or 80, suitable for use with 90 degree C rated wire.

2. Conform to UL Standard 65l and carry appropriate UL listing for above and below ground use.

2.4 WIREWAYS

A. Troughs: Steel, painted, square in cross section, preformed knockouts on standard spacing, screw cover.

B. Fittings: Tees, elbows, couplings as required for configuration shown on the Drawings.

2.5 FITTINGS

A. RMC and IMC:

1. Threaded Locknuts: Sealing type where used with NEMA 2, 3, 3R, 4, and 12 enclosures.

2. Threaded Bushings: 1-1/4-inch and larger, insulated, grounding type as required under Section 26 05 26, Grounding and Bonding for Electrical Systems.

3. Threaded Couplings:

a. Standard threaded of the same material and as furnished with conduit supplied.

b. Erickson type couplings may be used where required to complete conduit runs larger than 1-inch.

B. EMT:

1. Connectors:

a. Steel compression ring or steel set screw type for conduit termination, with insulated throat, suitable for conditions used.

b. Use lay-in grounding type bushings where terminating grounding conductors.

2. Couplings: Steel compression ring or steel set screw type, concrete tight.

C. Threadless: RMC and IMC couplings and box connectors may be steel threadless, compression ring or set screw type for use with conduits 1-inch and smaller where installed in poured concrete locations or where limited working space makes threaded fittings impractical.

D. Weatherproof Connectors: Threaded

E. Expansion Couplings: Equivalent to O.Z. type EX with jumper.

F. Seal-Offs: With filler fiber, compound, and removable cover.

2.6 METALLIC BOXES

A. Flush and Concealed Outlet Boxes: Galvanized stamped steel with screw ears for device ring mounting, knock-out plugs, mounting holes, fixture studs if required, RACO or equivalent.

B. Surface Outlet Boxes: Galvanized stamped steel same as above for use on ceilings; cast steel or aluminum with threaded hubs or bosses for use on walls.

C. Large Boxes:

1. Boxes exceeding 4-11/16-inches when required welded steel construction with screw cover and painted, steel gauge as required by physical size,

2. Manufacturers:

a. Hoffman

b. Circle AW

c. Or equivalent.

D. Systems:

1. Boxes for systems devices as recommended by the systems manufacturer, suitable for the equipment installed.

2. Equip with grounding lugs, brackets, device rings, etc., as required.

2.7 FLOOR BOXES

A. Combination concealed power, data and communications services floor box with flush-hinged door and cover assembly. Nominal 12-inch by 6-inch by 3-inch stamped steel concrete tight box with multiple conduit entrances and pre-pour and after-pour adjusting screws.

1. Heavy gauge steel doorplate suitable for carpet cut-in.

2. Gray High impact thermoplastic trim and carpet flange.

3. Tilted steel service plates for power and signal devices.

4. Provide an on-grade barrier pan with leveling feet and anchor points for slab on-grade applications.

5. Hubbell 3SFB-SS series or equal.

2.8 NON-METALLIC BOXES

A. PVC, molded enclosures, threaded hubs.

PART 3 EXECUTION

3.1 INSTALLATION

A. Conceal conduits in finished spaces. Concealed conduits run in a direct line with long sweep bends and offsets. Where RMC and IMC embedded is in concrete below grade or in damp locations make watertight by painting the entire male thread with Rustoleum metal primer or equivalent before assembly.

B. Route exposed conduit parallel or at right angles to structural building lines and neatly offset into boxes. Conduits attached directly to building surfaces closely follow the surfaces. Conduit fittings used to saddle under beams. Drilling or notching of existing beams, trusses on structural members coordinated with Architect prior to commencing.

C. Rigidly secure RMC and IMC terminations at boxes, cabinets, and general wiring enclosures with double locknuts and bushings or approved fittings. Screw in conduit and engage at least five threads in hub where conduit boxes with threaded hubs or bosses are used. Use insulating bushings for conduits 1-1/4-inches or larger.

D. Keep conduit and raceways closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete, or foreign objects. Clean and dry raceways before installation of wire and at the time of acceptance.

E. Pack spaces around conduits with polyethylene backing rods and seal with polyurethane caulking to prevent entrance of moisture where conduits are installed in sleeves or block-outs penetrating moisture barriers.

3.2 CONDUIT

A. RMC:

1. Use in areas for wiring systems.

2. Install for exposed runs of medium voltage circuits outside of the electrical rooms.

3. Install where subject to mechanical injury.

4. Install with threaded fittings made up tight.

B. IMC:

1. Use for medium voltage circuits where concealed or where exposed in the electrical rooms.

2. Use for circuits rated 600V and less where not in contact with earth or fill.

3. Install with threaded fittings made up tight.

C. EMT:

1. Use in other dry protected locations for circuits rated 600V and less.

2. Securely support and fasten whether exposed or concealed at intervals of nominally every 8-feet and within 24-inches of each outlet, ell, fitting, panel, etc.

D. Flex:

1. Use for connections to vibration producing equipment and where installation flexibility is required with a minimum 12-inches slack connection.

2. Limit flex length to 36-inches for exposed equipment connections and 72-inches in concealed ceiling and wall cavities.

3. Use PVC jacketed flex in wet locations, areas subject to washdown, and exterior locations.

E. PVC:

1. Type II Schedule 40 and 80 PVC may be used underground and in and under interior slabs, poured concrete walls, and where scheduled or noted on the Drawings.

2. Make connections with waterproof solvent cement.

3. Provide RMC at 60 degree and larger bends and where penetrating slabs.

3.3 RACEWAYS

A. Surface metal wireways may be installed at locations to serve motor starters or other control devices where required by a multitude of wiring interconnections or physical layout.

3.4 FITTINGS

A. Assemble continuous and secured metallic raceways and conduits to boxes, panels, etc., with appropriate fittings to maintain electrical continuity. Cut square and reamed smooth conduit joints with fittings drawn up tight.

B. Do not use Crimp-on, tap-on, indenter type, malleable iron, or cast set screw fittings.

3.5 BOXES

A. General:

1. Outlet Boxes: Code required size to accommodate wires, fittings, and devices.

2. Provide multi-gang boxes as required to accept devices installed with no more than one device per gang.

3. Equip metallic boxes with grounding provisions.

B. Size and Type:

1. Flush wall switch and receptacle outlets used with conduit systems 4-inches square, 1-1/2-inches or deeper, with one or two-gang plaster ring, mounted vertically. Where three or more devices are at one location, use one piece multiple gang tile box or gang box with suitable device ring.

2. Wall bracket and ceiling surface mounted luminaire outlets 4-inch octagon 1-1/2-inches deep with 3/8-inch fixture stud where required. Wall bracket outlets have single gang opening where required to accommodate luminaire canopy. Provide larger boxes or extension rings where quantity of wires installed requires more cubic capacity.

3. Junction boxes installed in accessible ceiling or wall cavities or exposed in utility areas minimum of 4-inches square, 1-1/2 inches deep with appropriately marked blank cover.

4. Boxes for the special systems suitable for the equipment installed. Coordinate size and type with the system supplier.

C. Pull Boxes:

1. Provide pull boxes where shown for installation of cable supports or where required to limit the number of bends in conduits to not more than three 90-degree bends.

2. Use galvanized boxes of code-required size with removable covers installed so that covers will be accessible after work is completed.

D. Installation:

1. Mount boxes and outlets at nominal centerline heights shown on the drawings.

2. Adjust heights in concrete masonry unit (CMU) walls to prevent devices or finish plates from spanning masonry joints.

3. Recessed Boxes:

a. Flush with finished surfaces or not more than 1/8-inch back, level and plumb.

b. Long screws with spacers or shims for mounting devices will not be acceptable.

c. No combustible material exposed to wiring at outlets.

4. Covers for flush mounted boxes in finished spaces extend a minimum of 1/4-inch beyond the box edge to provide a finished appearance. Finish edge of cover to match cover face.

5. Boxes installed attached to a stud in sheet rock walls equipped with opposite side box supports equivalent to Caddy 760. Install drywall screw prior to finish taping. Methods used to attach boxes to studs not to cause projections on the face of the stud to prevent full-length contact of sheet rock to the stud face.

3.6 PULL WIRES

A. Install nylon pull lines in empty conduits larger than 1-inch where routing includes 25-feet or more in length or includes 180 degrees or more in bends.

B. Where conduits requiring pull lines are stubbed out and capped, coil a minimum of 36-inches of pull line and tape at termination of conduit for easy future access. Label pull lines as to conduit starting or terminations point and intended future use.

END OF SECTION

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Labels

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 33, Raceways and Boxes for Electrical Systems

E. Section 26 27 26, Wiring Devices

F. Section 26 50 00, Lighting

G. Section 28 30 00, Fire Detection and Alarm

PART 2 PRODUCTS

2.1 LABELS

A. Pre-printed:

1. Permanent material pre-printed with black on white, with adhesive backing.

2. Manufacturer:

a. Brady

b. 3M

c. Or equal.

B. Engraved Laminated Plastic:

1. 3-ply laminated plastic, colors indicated herein, with beveled edges, engraved letters, and stainless steel screw attachment.

2. Nameplate length to suit engraving.

3. Adhesive attachment is not acceptable.

C. Clear Plastic Tape:

1. Black (normal) or red (emergency or standby) 12 point Helvetica medium text, clear adhesive backing, field printed with proper equipment for device labeling.

2. Manufacturers:

a. Brother P-Touch

b. Dyno-tape

c. Kroy

d. Or equal.

D. Wire Markers:

1. White with black numbers, adhesive-backed tape on dispenser roll.

2. Manufacturers:

a. Brady

b. 3M

c. Or equal.

E. Feeder Conduit Marking:

1. Provide one-piece snap-around vinyl feeder conduit markers for feeder conduits.

2. Provide custom label, black letters on orange background indicating destination equipment, 1-1/4-inch high letters (minimum) – Seton Setmark Pipe Marker Series.

3. Provide additional one-piece snap-around vinyl label, black letters on orange background for voltage designation (i.e., 277/480V, 120/208V).

4. Secure labels to conduits using plastic tie wrap, two per label.

F. Marker Pen: Black permanent marker suitable for writing on metallic surfaces.

PART 3 EXECUTION

3.1 GENERAL

A. Nameplate and text coloring:

1. Normal Black nameplate with white lettering.

2. Emergency Orange nameplate with black lettering.

3. Standby Yellow nameplate with black lettering.

4.	UPS	Blue nameplate with white lettering.

3.2 EQUIPMENT

A. Provide engraved laminated plastic nameplate on the face of disconnect switches, motor starters, relays, contactors, and etc., indicating equipment served (e.g., AHU-1) and equipment load (e.g., 20 hp). Provide additional engraved laminated plastic nameplate indicating serving panel designation and circuit number.

B. Provide clear plastic tape label for relays, contactors, time switches, and miscellaneous equipment provided under this Division of work indicating equipment served.

3.3 FEEDER CONDUIT

A. Provide feeder conduit marker for electrical feeders.

B. Provide markers when exiting source equipment and located along the entire conduit length 20-feet on centers in exposed areas, above ceilings, and upon entering or leaving an area or room.

3.4 DEVICES

A. Label each receptacle plate with preprinted clear plastic tape indicating serving panel and circuit number (e.g., PANEL 2PA-5). Clean oils, dirt, and foreign materials from plate prior to label application. Label receptacles connected to a GFCI protected circuit downstream from the protecting device.

3.5 RACEWAYS AND BOXES

A. Label pull boxes and junction boxes for systems with paint or marker pen on box cover identifying system. Where box covers are exposed in finished areas, label inside of cover.

B. Color label covers as follows:

1.	480Y/277V wiring	Orange
2.	208Y/120V wiring	Black
3.	Fire Alarm	Red
4.	Communications	Green
5.	Security	Blue

C. Label each end of pull wires left in empty conduits with tags or tape indicating location of other end of wire.

3.6 SYSTEMS

A. Complex control circuits may utilize combination of colors with each conductor identified throughout using wraparound numbers or letters. Use the number or letters shown where the Drawings or operation and maintenance data indicate wiring identification.

B. Label the fire alarm and communication equipment zones, controls, indicators, etc., with machine-printed labels or indicators appropriate for the equipment installed as supplied or recommended by the equipment manufacturer.

3.7 EXISTING EQUIPMENT

A. Provide new nameplates and labels for existing distribution equipment in accordance with panel descriptions shown on the Drawings. Provide new labels for feeder devices where labels are non-existent, incorrect, or confusing on existing distribution panels affected by this work.

B. Equip existing branch circuit panelboards scheduled to remain with new, accurate, typed, circuit directories where circuiting changes are made.

END OF SECTION

ELECTRICAL TESTING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Testing Equipment

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 26, Grounding and Bonding for Electrical Systems

E. Section 28 30 00, Fire Detection and Alarm

1.3 TESTING CRITERIA

A. General:

1. Perform field tests and operational checks to assure that all electrical equipment, both contractor and Owner supplied, is operational within industry and manufacturer's tolerances, and is installed in accordance with design specifications.

2. The tests and operational check shall determine the suitability for energization.

3. Schedule tests and give a minimum of one week's advance notice of time and date to the Architect and Owner for any major systems tests specified in this Section.

4. The testing company shall provide the equipment and technical personnel to perform all tests and inspections. At Contractors expense, furnish any personnel necessary to assist in the testing and inspection.

5. When tests and inspections are complete, attach a label to the devices tested. Provide on the label, the name of the testing company, date of tests, and initials of the Engineer who performed the tests.

B. Responsibilities:

1. Clean the equipment, torque down accessible bolts according to the equipment manufacturer's instructions; perform routine insulation resistance tests on branch and feeder circuits, continuity checks on branch and control wiring, and rotation tests for distribution and utilization equipment.

2. Furnish a complete set of current plans and specifications to the testing company prior to commencement of testing. At each test site, provide test control power necessary to perform the tests specified. Consult the test organization as to the specific power requirements. Notify the testing organization when the equipment and systems are ready for their inspections and testing. After review by the testing engineer, correct deficiencies noted by the testing company.

3. Responsible for having the manufacturer of each equipment and/or system provide factory trained representatives(s) that will perform required functional testing, checkout, and repairs in order to pronounce the equipment and/or systems meet the requirements of these specifications and Drawings and it is ready for startup testing and commissioning by the testing organization as specified hereafter.

4. Furnish settings of protective devices by the Engineer, in conjunction with Utility.

5. Testing organization to notify Engineer prior to the commencement of testing. The testing organization, set, and adjust the protective devices and associated auxiliary timing devices in accordance with the values furnished by the Engineer. The testing organization maintains a written record of tests and, upon completion of the test, include them in a final report. Detail deficiencies in the system material, workmanship, or design.

C. Implementation:

1. Safety practices comply with applicable state and local safety orders, as well as with the Occupational Safety and Health Act (OSHA). Compliance with the National Fire Protection Association (NFPA) standard NFPA 70E, and the Accident Prevention Manual for Industrial Operations of the National Safety Council.

2. Tests, other than phase rotation and operational tests, only performed on apparatus that is deenergized. The testing company's lead test engineer for the project designated safety representative and supervise testing observations and safety requirements. Do not proceed with Word until determined that it is safe to do so.

3. Power Circuits: Conductors shorted to ground by a hotline grounding device approved for the purpose. Provide warning signs and protective barriers as necessary to conduct the tests safely.

D. Reports:

1. General: Provide full documentation of tests in the form of a report.

2. Test report includes the following sections:

a. Scope of Testing

b. Equipment Tested

c. Description of Test

d. Test Results

e. Conclusions and Recommendations

f. Appendix, including Test Forms

3. Record each piece of equipment on a data sheet listing the condition of the equipment as found and as left. Include recommendations for necessary repair and/or replacement parts. Indicate on data sheets the name of the engineer who tested the equipment and the date of the test completion.

4. Submit record copies of the completed test report no more than 30 days after completion of the testing and inspection.

1.4 REFERENCES

A. The testing and inspection comply with applicable sections of the applicable codes and standards listed in Section 26 05 00, Common Work Results of Electrical of the project specifications.

B. The inspection and testing comply with the project plans and specifications, as well as with the manufacturer's drawings, instruction manuals, and other applicable data that may be provided by the Engineer, for the apparatus tested.

1.5 QUALIFICATIONS

A. Testing Organization:

1. Independent division of the manufacturer of the assembled products being tested. If an outside testing organization is utilized, a representative of the manufacturer under contract by the testing company. Be present during testing to ensure the testing is performed properly and deficiencies discovered are promptly corrected.

2. Full Service Company that employs factory trained test engineers capable of troubleshooting, as well as identifying power equipment problems.

3. Perform Work outlined under the full time, onsite supervision of a graduate engineer with a minimum of 5 years of field testing experience.

4. Upon request, submit proof of its qualifications.

PART 2 PRODUCTS

2.1 TESTING EQUIPMENT

A. Testing agency to have calibration program, which maintains applicable test instrumentation within rated accuracy. Traceable accuracy to the National Bureau of Standards in an unbroken chain. Calibrate instruments calibrated in accordance with the following frequency schedule:

1. Field Instruments: 6 months maximum.

2. Laboratory Instruments: 12 months.

3. Leased Specialty Equipment: 12 months (where accuracy is guaranteed by lessor). Dated calibration labels visible on test equipment.

PART 3 EXECUTION

3.1 EQUIPMENT TO BE TESTED

A. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables:

1. For circuits rated 400A or higher perform tests listed in the NETA 2017 Acceptance Testing Specifications for Low-Voltage Cables, Section 7.3.2.

B. Section 28 30 00, Fire Alarm and Detection

1. Fire Alarm System: Perform tests listed in Section 28 30 00, Fire Detection and Alarm.

END OF SECTION

LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Control Stations
2. Occupancy/Vacancy Sensors
3. Relays, Switchpacks, and Room Controllers
4. Power Supplies and Transformers
5. Emergency Lighting Control Relays
6. Low Voltage Control Wiring
7. Test Equipment

B. Responsibilities and participation under Division 26, Electrical in the automatic dimming system installation and commissioning process.

C. Installation, connection, adjustment, and testing of the equipment including labor, materials, tools appliances, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational lighting control system

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 09 43, Network Lighting Controls

D. Section 26 27 26, Wiring Devices

E. Section 26 50 00, Lighting

1.3 GENERAL REQUIREMENTS

A. Provide qualified personnel for participation in commissioning tests, including seasonal testing required after the initial commissioning.

B. Providing equipment, materials, and labor necessary to correct deficiencies found during the commission process which fulfill contract and warranty requirements.

C. Provide Operating and Maintenance Data and Record Drawings to the Test Engineer for verification, organization, and distribution.

D. Provide assistance to the Test Engineer to develop and edit descriptions of system operation.

E. Providing training for the systems specified in this Division with coordination by the Test Engineer and Commissioning Agent.

1.4 SUBMITTALS

A. Shop drawings:

1. Submittal drawings with a complete system diagram to show quantity of devices, location in the building, dimensions and required wiring.

2. Occupancy sensors, show the required quantity to cover the space controlled (note: this may be more than the quantity shown on the drawings.

3. The locations shown on the drawings are for reference only and coordinated with the manufacturer and Architect for final quantity and location during the bid process to allow for allowance of proper quantity, wiring lengths and installation coordination)

4. Provide physical samples of user interface devices and visually exposed control devices for approval by Owner and Architect.

B. Product data with wiring schematics for system and user interface components

C. Installation and Record Drawings

D. Operation and Maintenance Manuals:

1. Include product data of system components, one line diagrams of installed components and their locations throughout the building, a final floor plan noting the locations of devices installed above ceilings, behind access panels or in concealed but accessible spaces and the lighting zones or devices they control.

2. Final relay schedule with the zone of control, location of control zone, voltage, power feed, time clock setting, photocell set point, switch, or dimmer stations controlling the relay, and sweep function set points will be provided by the contractor.

1.5 DEFINITIONS

A.	BACNET	Protocol for integration with BAS/BMS/EMS
B.	BAS / BMS / EMS Management System	Building Automated System, Building Management System, Energy
C.	CS	Control Station
D.	D	Dimming Wall Switch
E.	DT	Dual Technology (PIR + U)
F.	FC	Footcandles. The metric for measuring light levels / illuminance levels
G.	GUI	Graphic User Interface
H.	LCP	Lighting Control Panel

I. LED Light Emitting Diode

J. LonWorks Protocol for integration with BAS/BMS/EMS

K. OS/VS Occupancy Sensor / Vacancy Sensor,

1. Occupancy sensors provide automatic on and automatic shut-off.

2. Vacancy sensors provide automatic shut-off only, and require manual-on.

L. PC Photocell

M. PIR Passive Infrared Technology

N. RS RS-232 Connection for AV Integration

O. SC Scene Control

P. TC Timeclock, or astronomical timeclock

Q. U Ultrasonic Technology

R. WS Wall Switch

S. WS/O Wallbox Occupancy Sensor Switch

1. Wall Switch with integrated Occupancy Sensor

1.6 SYSTEM DESCRIPTION

A. Control Stations:

1. Control Station Types:

a. Provide control stations for occupant lighting control as scheduled on the drawings and may include and/or combine the following type of individual control type within a single station:

(1) Scene Selection

(2) On/Off Switching

(3) Dimming Raise/Lower

(4) Occupancy/Vacancy Sensor

B. Relays, Switchpacks, and Room Controllers:

1. Analog and Digital: Room controller devices to accept line voltage input as well as input from any combination of control stations, occupancy/vacancy sensors and/or daylight sensors and produce the required effect (switching or dimming) on up to four zones of connected lighting.

C. Occupancy/Vacancy Sensing:

1. Reduce electric energy consumption by reducing or eliminating lighting energy use in unoccupied spaces by switching lighting off with occupancy and/or vacancy sensors.

D. Emergence Override: Provide automatic load control relay devices for controlling egress lighting circuiting.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer:

1. Acuity Controls (nLight, LC&D, Sensor Switch)

B. Approved Basis of Design Alternate Manufacturers:

1. Cooper Controls

2. Wattstopper

3. Lutron

C. Products described in this section are to be provided by the single BOD (basis of design), or approved alternate, manufacturer, listed above, or by a compatible, BOD approved third party alternate manufacturer.

1. Manufacturer series numbers are identified herein to establish the minimum level of quality for each product.

2. Comparable products that meet the requirements of the specification by other acceptable manufacturers identified herein are acceptable with prior approval.

3. Other or equivalent Manufacturers and Products: Submit Substitution Request, complying with requirements of Division 00, Procurement and Contracting Requirements.

2.2 CONTROL STATIONS

A. Control Station Types:

1. Scene Select: Provide four scene selection control station including discrete, engraveable pushbuttons allowing on/off and raise/lower control of entire space and means for occupants to select from four scenes indicated on drawings On/Off:

a. Provide individual pushbuttons

b. Controls lighting in entire space if no zones indicated on plans.

2. Dimming/Raise Lower:

   a. Provide individual pushbuttons for on and off control of zones indicated on plans.

   b. Controls lighting in entire space if no zones indicated on plans.

   c. Dimming accomplished by separate up and down pushbuttons

3. Integral Occupancy:

   a. Automatically switches lighting on when occupant enters space.

   b. Switches lights off after predetermined period of vacancy.

   c. Controls lighting in entire space.

4. Integral Vacancy:

   a. Includes pushbuttons for occupant manual on/off and dimming control of lighting in space.

   b. Automatically switches lights off after predetermined period of vacancy.

   c. Includes provision to revert to occupancy control in absence of configurable amount of daylight.

   d. Controls lighting in entire space.

B. Line Voltage Dimming Switches:

1. Architectural grade, line voltage, 20A rated, single pole, preset style, slide up to brighten and down to dim, with on/off rocker style switch, decora style, wattage rating and lamp/power supply compatibility as required.

2. Forward Phase, Reverse Phase, 0-10V.

3. Provide 3-way type where shown on plan.

4. Lutron Diva Series

C. Wallbox Occupancy Sensor Switches:

1. 180 degree coverage, type as shown on plan (PIR, ultrasonic or dual-technology), configurable automatic-on or manual on operation, 3-wire type, daylight override, adjustable time-out, selectable walk-through mode and override off switch. Single or dual relay type as required or as shown on Drawings.

2. Provide 3-way type where shown on plan.

3. WattStopper PW series.

D. Digital Control Stations:

1. Provide control stations with configuration as indicated or as required to control the loads as indicated.

2. General Requirements:

a. Power: Class 2 (low voltage).

b. UL listed.

c. Provide faceplates with concealed mounting hardware, with matching finish.

d. Borders, logos, and graduations to use laser engraving or silk-screened graphic process that chemically bonds graphics to faceplate, resistant to removal by scratching and cleaning. Self-Adhesive labels not permitted.

e. Finish: As specified for wall controls in this Section.

3. Single-Zone or Single-Group:

a. Turn an individual fixture or group of fixtures as shown on plans on and off via button press.

b. Raise and lower light levels via press and hold button.

(1) Separate buttons for dimming and on/off functions not allowed.

4. Multi-Scene or Multi-Group:

a. General Requirements:

(1) Allows control of any devices part of the lighting control system as indicated on plans.

(2) Controls can be programmed with different functionality through system software without any hardware changes. Allows contextual functions based upon button press and press and hold input.

(3) Allows for easy reprogramming without hardware replacement.

(4) System will automatically update programming without direct human interaction upon replacement of any component.

(5) Communications: Utilize RS485 or similar wiring for low-voltage communication.

(6) To help occupants understand how to use the lighting control system, engraving requirements should be included for controls. Engraving details should include text size and style.

(7) Engrave keypads with button, zone, and scene descriptions as indicated on the drawings.

(8) Software Configuration:

(a) Single defined action.

(b) Buttons can be programmed to perform defined action on press and defined action on release.

(c) Buttons can be programmed using conditional logic off of a state variable such as time of day or partition status.

(d) Buttons can be programmed to perform automatic sequence of defined actions.

(e) Capable of deactivating select keypads to prevent accidental and/or unwanted changes to light levels and other settings.

(f) Buttons can be programmed for raise/lower of defined loads.

(g) Buttons can be programmed to toggle defined set of loads on/off.

(9) Status LEDs:

(a) Upon button press, LEDs to immediately illuminate.

(b) Time delays inherent in large systems can cause short delays between button press and system confirmation. To avoid any confusion and prevent multiple button presses, keypads should immediately show that the button has been pressed for visual confirmation.

(c) LEDs to reflect the true system status. LEDs to remain illuminated if the button press was properly processed or LEDs to turn off if the button press was not processed.

(d) Support logic that defines when LED is illuminated:

1) Scene logic (logic is true when zones are at defined levels).

2) Room logic (logic is true when at least one zone is on).

3) Pathway logic (logic is true when at least one zone is on).

4) Last scene (logic is true when spaces are in defined scenes).

b. Wired Keypads:

(1) Style:

(a) Mounting: Wall box or low-voltage mounting bracket; provide wall plates with concealed mounting hardware.

(2) Design keypads to allow field-customization of button color, configuration, and engraving using field-changeable replacement kits.

(3) Terminal block/connector inputs to be over-voltage and miswire-protected against wire reversals and shorts.

(4) LEDs next to each button are used during programming and provide feedback when the buttons are pressed.

(5) Available with status LEDs.

(6) Available in several button configurations and finishes.

1) .

2.3 STANDALONE ROOM CONTROLLERS

A. General:

1. Provides a common, standalone interface via dimming and/or switching to a group of 0-10V Dimming or Fixed Output Ballasts and/or 0-10V LED Drivers.

2. Direct conduit connection or provision for mounting to junction box.

3. Physical barriers provided between Class 1 and Class 2 wiring as well as between normal power and emergency power wiring.

4. Dual voltage 120/277V, 60HZ operation, 20A rating for each relay Relays utilize zero crossing technology for increased life.

5. Plenum Rated.

B. Digital Room Controllers and Switchpacks:

1. Replacement of any component requires no reconfiguration or reprogramming.

2. Low voltage connections via CAT5/6 and RJ-45 connectors.

3. On board power supply for a minimum of six accessory devices including, but not limited to occupancy sensors and control stations.

4. Up to four on-board relays and accompanying 0-10V dimming channels.

5. Provision for IR or RF remote for configuration and editing of connected device settings.

a. Provide means to copy settings from on system to another.

6. Field configurable to support, occupancy (automatic on) and vacancy (manual on) control protocol. Daylight harvesting feature for any number of zones.

7. Timeclock Functionality:

a. Provide functionality to directly trigger relay and dimmer settings by timeclock event and:

b. Mask or lock out sensor and/or control station inputs by timeclock event.

8. Room Controller: As indicated on drawings

9. Switchpack: Approved Equal

C. Analog Room Controllers and Power Packs:

1. On board power supply for a minimum of six accessory devices including, but not limited to occupancy sensors.

2. Up to four on-board relays and accompanying 0-10V dimming channels.

3. Provision for IR or RF remote for configuration and editing of connected device settings.

a. Provide means to copy settings from on system to another.

4. Field configurable to support, occupancy (automatic on) and vacancy (manual on) control protocol with optional daylight harvesting feature.

2.4 OCCUPANCY/VACANCY SENSORS

A. General Requirements:

1. Power Failure Memory: Settings and learned parameters to be saved in non-volatile memory and not lost should power be interrupted and subsequently restored.

2. Furnished with necessary mounting hardware and instructions.

3. NEC Class 1 or 2 devices, refer to plans.

4. Ceiling-Mounted Sensors: Indicate viewing directions on mounting bracket.

5. Wall-Mounted Sensors: Provide swivel-mount base.

6. Ceiling-Mounted Sensors: Provide customizable mask to block off unwanted viewing areas.

7. Isolated Relay: Provide ceiling mounted sensors with an internal isolated relay with Normally Open, Normally Closed, and Common outputs rated at 1A at 30VDC/VAC for use with HVAC control, Data Logging and other control options.

8. Line Voltage sensors accept line voltage input and output switched line voltage directly to controlled luminaires.

a. Line voltage sensors must be capable of occupancy or vacancy control. Operation is to be determined by onboard device settings.

b. Sensor configuration to be made by integral pushbutton or dial controls.

c. Types:

(1) PIR: utilize invisible light to determine occupancy.

(2) Ultrasonic/Microphonic: utilize audible or subaudible sound to determine occupancy.

(3) Dual-Tech: utilize a combination of the above technologies to determine occupancy.

(a) Detection of vacancy by both ultrasonic and PIR sensors required to turn lights off.

d. Types:

(1) Dual-Tech: Utilize a combination of the above technologies to determine occupancy.

(a) Detection of vacancy by both ultrasonic and PIR sensors required to turn lights off.

B. Ceiling Mounted: 360 degree coverage:

1. Automatic-on operation, light-level sensing, adjustable time-out, automatic sensing/adjustment for optimal time-out delay setting, selectable walk-through mode.

2. Low- or line-voltage as shown on Drawings or described in Section 26 09 93, Sequence of Operations for Lighting Controls,

3. Surface mounted, provide power packs as required.

C. Ceiling/Wall Mounted/Corner: 180 degree coverage:

1. Automatic-on operation, light-level sensing, adjustable time-out, automatic sensing/adjustment for optimal time-out delay setting, selectable walk-through mode,

2. Low-voltage with power pack, surface mounted as required.

D. Provide multiple contacts and/or power packs for Low Voltage occupancy sensors that:

1. Control both normal and emergency lighting and require separation of branch circuit wiring systems. In case of occupancy sensor failure, emergency lighting fail to the on state.

2. Control separate lighting control zones. Unless otherwise noted, occupancy sensors are intended to control light in a designated zone or room. Contractor is responsible for providing the required power packs to insure functionality of the system.

3. Provide UL924 listed relay or power pack for to bypass occupancy sensors in event of power failure. During normal operation, relay to operate lighting in conjunction with adjacent normal power lighting.

E. High Ceiling Occupancy Sensor:

1. Provide low or line voltage occupancy sensors where shown on plans.

2. Automatic-on or manual-on operation, light-level sensing, adjustable time-out, automatic sensing/adjustment for optimal time-out delay setting, selectable walk-through mode.

3. Suitable for mounting heights from 12-feet-40-feet.

4. Surface mounted, provide auxiliary contacts if required.

2.5 RELAYS, SWITCHPACKS AND ROOM CONTROLLERS

A. Analog:

1. Devices interconnected via low voltage cabling.

2. Configurable to produce the following sequences of operation by board dip-switch style controls.

a. Occupancy control: Automatically turns lights on when occupant is detected in space. Automatically turns lights off after a configurable period of vacancy.

b. Vacancy Control: Occupant must manually turn lights in space on, automatically turns lights off after a configurable period of vacancy.

c. Timeclock

d. Daylight Harvesting:

(1) Occupant must manually turn lights in space on, automatically turns lights off after a configurable period of vacancy.

(2) Accepts input from analog daylight sensing equipment and adjusts light level settings accordingly.

B. Digital:

1. Devices interconnected by pre-terminated CAT5e/CAT6 Cabling. of operation by on-board dip-switch style controls.

a. Occupancy Control:

(1) Automatically turns lights on when occupant is detected in space.

(2) Automatically turns lights off after a configurable period of vacancy.

b. Vacancy Control: Occupant must manually turn lights in space on, automatically turns lights off after a configurable period of vacancy.

c. Timeclock

d. Daylight Harvesting

(1) Occupant must manually turn lights in space on, automatically turns lights off after a set period of vacancy.

(2) Accepts input from daylight sensing equipment and adjusts light level settings accordingly.

2. Provides additional capability or accessories to integrate with AV, BAS, HVAC, and/or shade control systems.

2.6 POWER SUPPLIES AND TRANSFORMERS

A. Provide from same manufacturer of equipment served.

B. Compatible with specified photocells and dimming control station protocols.

C. Refer to Section 26 50 00, Lighting, for product specification on luminaire power supplies and transformers.

2.7 EMERGENCY LIGHTING CONTROL RELAYS

A. Manufacturers:

1. Bodine

2. Nine 24

3. Wattstopper

4. Or approved equivalent.

B. General Requirements

1. Comply with UL924 requirements:

a. If controlled off, must turn on automatically.

b. Provide required egress illuminance along entire egress path.

c. Must not be able to be overridden by building occupants.

2. Unless shown otherwise on drawings, load control relay provided is to control egress lighting along with adjacent normal power lighting except in event of power failure fire alarm system alarm status.

3. Device can be integral to other components listed above or operate in conjunction with other lighting control components as a discrete component, but must be fed via UL 1008 compliant power source, such that in event of a power failure, control and dimming signals are bypassed and lighting operates at full power. Fed via the UL 1008 source.

C. Description:

1. Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts.

2. UL924 listed for connected load of 10A at 277V or 120V.

3. UL rated N.C. contacts, minimum 10A rating.

4. Integral surge protection.

5. Two separate status emergency lighting indicators for troubleshooting:

   a. Amber LED indicates presence of normal utility power.

   b. Red LED indicates presence of unswitched emergency power.

6. Manual and/or automatic diagnostic testing feature.

7. Self-contained enclosure UL listed for installation in indoor or damp locations.

2.8 LOW VOLTAGE CONTROL WIRING

A. 18 gauge shielded cable or as recommended by the manufacturer.

2.9 TEST EQUIPMENT

A. Provide multi-function digital Illuminance meter with detachable receptor head with the following characteristics:

1. Receptor: Silicon photocell type

2. Illuminance Units: Lux or footcandles (switchable)

3. Measuring range: 0.1 to 19,990 lux, 0.01 to 1,999 footcandles

4. Accuracy: ±4 percent ±1 digit of displayed value

5. Cosine Correction Characteristics: Within ±1 percent at 10 degrees; within ±5 percent at 60 degrees.

6. Measuring functions: Illuminance, integrated illuminance, average illuminance.

7. Temperature/humidity drift: Within ±3 percent ±1 digit (of value displayed at 68 degrees F) within operating temperature/humidity range.

8. Operating conditions: 32 degrees F to 104 degrees F) at less than 85 percent humidity.

B. Provide proof of calibration within 12 months of use. Calibration performed by an independent calibration lab approved by the manufacturer of the meter.

PART 3 EXECUTION

3.1 INSTALLATION

A. Submittal data required prior to ordering and installation.

B. General Testing:

1. Functionally test control devices to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved drawings, specifications, and manufacturers installation instructions.

2. Prepare and complete report of test procedures and results and file with the Owner.

3. Install items per manufacturers written instructions.

C. Control Stations:

1. Control Stations to be combined wherever possible to minimize quantity of discrete gangs.

2. Combine under common cover plates wherever shown together on plans.

D. Low Voltage Wiring:

1. Install in conduit where running through inaccessible areas. Provide plenum rated wiring in accessible ceiling spaces.

2. Test CAT5/6 cables terminated on site prior to wiring of digital lighting control systems. Provide evidence of successful testing to engineer and owner. Factory pre-terminated cabling is not subject to this requirement.

3. Coordinate low voltage wiring connection and location with luminaires to be controlled.

E. Photocell:

1. Install surface mounted on recessed junction box in location best suited for accurate measurement. Avoid placement in high traffic or confined spaces.

F. Occupancy Sensors:

1. For installation of low voltage occupancy sensors in inaccessible ceiling systems, coordinate power pack locations with Architect prior to installation and provide access panels as required, coordinate access panel locations with Architect.

2. Sensor locations identified on Drawings are diagrammatic and are meant to indicate only that occupancy sensing within a given space is required. Locate sensors as required by the manufacturer to provide maximum coverage of the room, to operate as someone enters the room, and to avoid false operation due to persons outside the room passing an open door.

   a. Provide additional sensing heads as necessary or per manufacturer's recommendation to achieve complete coverage of each room.

3. Set sensitivity as required to provide small movement coverage throughout the room without extending coverage beyond the room.

4. System performance testing done with the sensor timing set to the time delay indicated by space type in Section 26 09 93, Sequence of Operations for Lighting Controls.

5. Upon Completion of installation and prior to turning space over to Owner, Contractor reset occupancy sensor automatic self-adjustment settings to insure proper time delay self-adjustment for Owner occupant schedule and room use.

6. Allow for up to 24 hours of callback sensor adjustments to be made by the contractor or occupancy sensor manufacturer qualified installer for up to six months after the owner has taken occupancy of the space.

G. Emergency Lighting Control Relays:

1. Provide unswitched emergency circuit, and unswitched and switched normal circuit to UL924 relay for control of emergency luminaires with remaining room luminaires on normal power.

2. Install each relay within dedicated 4-11/16-inch junction box with double-gang plaster ring for wall or ceiling flush-mount or in a self-contained enclosure from the manufacture, as indicated on Drawings.

3. Where location in ceiling would interfere with removal of ceiling tiles, install relay flush-mounted in nearest wall at ceiling level.

4. Do not locate behind wall switch.

3.2 WORK PRIOR TO COMMISSIONING

A. Complete phases of work so the system can be powered, tested, adjusted, and otherwise commissioned. Under Division 26, Electrical, complete systems, including subsystems, so they are fully functional. This includes the complete installation of equipment, materials, wire, controls, etc., in accordance with the contract documents and related directives, clarifications, change orders, etc.

B. A commissioning plan will be developed by the Test Engineer and approved by the Commissioning Agent. Under Division 26, Electrical, assist the Test Engineer and Commissioning Agent in preparing the commissioning plan by providing necessary information pertaining to the actual equipment and installation. If system modifications and clarifications are in the contractual requirements of this and related sections of work, they will be made at no additional cost to the Owner. If Contractor initiated system changes have been made that alter the commissioning process, the Commissioning Agent will notify the Owner.

C. Specific pre-commissioning responsibilities under Division 26, Electrical are as follows:

1. Factory startup services for the following items of equipment:

a. Lighting Control System

2. Normal startup services required to bring each system into a fully operational state. This includes complete installation and cleaning. The Test Engineer will not begin the commissioning process until each system is documented as being installed complete.

D. Begin commissioning after installation of interior and exterior finishes including but not limited to adjacent roofing, finished floor, wall, and ceiling systems including final painting, furniture and book stacks in place, and other building systems which have direct or indirect influence on the performance and distribution of the daylight and electric lighting systems.

E. Start of commissioning before such items are complete will not relieve Contractor from completing those systems in accordance with the Construction Schedule.

3.3 SEQUENCE OF COMMISSIONING

A. Provide to Architect prior to start of commissioning layout drawings indicating proposed location of measurement points. Proceed with commissioning after review and acceptance by Architect.

B. Illuminance measurements oriented horizontal, facing up, at 30-inches above finished floor. Measurements for a control group occurs at the same location. Ensure constancy of local surface reflectance conditions throughout commissioning of each control group.

C. Ensure no personnel or outside influence affects the amount of flux striking the receptor head during the recording session.

D. Document measurements in clearly understandable format for review by the Architect. Include time of measurement, temperature, and relative humidity.

E. Measure illuminance at least two hours after local sunset with full output of electric lighting. Record integrated illuminance and average illuminance for a 2 hour period.

F. During daylight hours, measure illuminance with electric lighting off, including emergency and nightlight circuits. Record integrated illuminance and average illuminance for a two hour period. Document in clearly understandable format for review by the Architect.

G. Set each photocell to 150 percent of electric-only lighting contribution.

H. After initial setpoint has been set, measure illuminance in 10 minute increments from 1 hour before to 1 hour after local sunset.

I. Submit recorded data to Architect for review.

3.4 TESTING FOR SEASONAL VARIATIONS

A. Timing of Commissioning:

1. Initial Commissioning:

a. Perform to best suit the current time-of-year and cloud cover conditions.

b. Conduct as done as soon as contract work is completed regardless of season.

2. Seasonal Commissioning: Test under full sunlight and full overcast conditions during summer and winter solstice, as well as similar conditions at the spring or fall equinox.

3. Subsequent Commissioning: Ascertain adequate performance during the four seasons.

3.5 PARTICIPATION IN COMMISSIONING

A. Provide skilled technicians to start up systems within Division 26, Electrical. The same technicians made available to assist the Test Engineer and Commissioning Agent in completing the commissioning program as it relates to each system and their technical specialty. Work schedules, time required for testing, etc., will be requested, and coordinated by the Test Engineer. Under Division 26, Electrical, ensure that the qualified technician(s) are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments, and problem resolutions at no additional cost to the Owner.

B. System problems and discrepancies may require additional technician time, Test Engineer time, Commissioning Agent time, redesign, and reconstruction of systems and system components. The additional technician time made available for the subsequent commissioning periods until the required system performance is obtained at no additional cost to the Owner.

C. Commissioning Agent reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment or system. Qualifications of technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service the commission the equipment, and a willingness to work with the Test Engineer and Commissioning Agent to get the job done. Remove technicians from the project at the request of either the Test Engineer or Commissioning Agent.

3.6 RESOLUTION OF DEFICIENCIES

A. In some systems, misadjustments, misapplied equipment, and deficient performance will result in additional work required to commission the systems.

B. Complete work under the direction of the Architect, with input from the Contractor, equipment supplier, Test Engineer, and Commissioning Agent.

C. Whereas members will have input and the opportunity to discuss the work and resolve problems, the Architect will have final jurisdiction on the necessary work to be done to achieve performance.

D. Complete corrective work in a timely fashion to permit timely completion of the commissioning process.

E. Experimentation to render system performance is permitted. If the Commissioning Agent deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Commissioning Agent will notify the Owner, indicating the nature of the problem, expected steps to be taken, and the deadline for completion of activities.

F. If deadlines pass without resolution of the problem, the Owner reserves the right to obtain supplementary services, equipment, or both, to resolve the problem.

G. Costs incurred to solve the problems in an expeditious manner will be the Contractor’s responsibility.

3.7 TRAINING

A. Participate in the training of Owner's engineering and maintenance staff, as required in Divisions 01 through 28, on each system and related components.

B. Conduct training in a classroom setting, with system and component documentation, and suitable classroom training aids.

C. Training classroom sessions and file demonstrations will be videotaped and copies of this material will be provided as part of closeout requirements.

D. Training will be conducted jointly by the test engineer, commissioning agent, the contractor, and the equipment suppliers.

E. Test engineer responsible for highlighting system peculiarities specific to this project.

3.8 SYSTEMS DOCUMENTATION

A. In addition to the requirements of Division 01, General Requirements, update contract documents to incorporate field changes and revisions to system designs to account for actual constructed configurations.

B. Division 26, Electrical, record drawings include architectural floor plans and the individual daylight control systems in relation to actual building layout.

C. Provide in AutoCAD .dwg format for transmittal to the test engineer.

END OF SECTION

NETWORK LIGHTING CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Lighting Control Equipment

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Division 23, Heating, Ventilation, and Air Conditioning

D. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

E. Section 26 09 23, Lighting Control Devices

F. Section 26 27 26, Wiring Devices

G. Section 26 50 00, Lighting

1.3 QUALITY CONTROL

A. Install by an experienced contractor in the installation of lighting control systems. Provide a factory technician to supervise the installation and installation and make final adjustment and tests of the system.

B. Furnish evidence of an experienced service organization which stocks system parts and is capable of providing repair service within 24 hours.

1.4 SUBMITTALS

A. Shop Drawings

B. Product Data with Wiring Schematics

C. Installation and Record Drawings

D. Operation and Maintenance Manuals

1.5 SYSTEM OPERATION

A. Use a modular component approach, utilizing a central processor, transceivers which activate relays and relay cabinets.

B. Incorporate the following criteria:

1. Control information from the controller to the transceiver multiplexed over a single pair of wires.

2. Conform control wiring to NEC Article 725, Class 2.

3. Components: Standard catalog items available through electrical distributors.

4. Expandable to control up to 4,000 relays. Relays operable from 2 or 3-wire control systems.

5. Programmable on site to achieve control functions and be readily updatable to reflect changes without requiring rewiring.

C. Installed system capable of the following control functions:

1. Automatic Control: Areas to be activated in user dictated patterns (ON-OFF array of relays) according to either a weekly schedule broken into one-minute increments or alternate daily schedules pre-programmed for holidays.

2. Manual Controls: Control relay or group of relays with either a maintained or momentary switch; activate group of relays to one of ten user determined patterns via a touchtone or pushbutton phone or the controller keyboard.

D. Select, activate, and lock-in lighting pattern from the central controller with provisions to lock out manual and automatic commands.

E. Adisplay capable of displaying:

1. Pattern schedules and overrides.

2. Priority manual overrides.

3. Current state of each relay in system.

4. Time, day, and date.

F. Indicate to the operator transceiver failure.

G. Internal battery backup of ten hours for memory protection. Store program information on a disc and automatically reload the controller after a power outage longer than the battery backup.

H. Capable of turning on circuits for continued operation should control component fail.

I. A self-diagnostic routine to indicate a malfunction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Greengate

B. G.E.

C. LC&D

D. Or approved.

2.2 LIGHTING CONTROL EQUIPMENT

A. Main Controller:

1. Microcomputer pre-programmed for lighting control. Incorporate a 365-day clock and provide minute-by-minute control of the entire lighting system of up to 4,000 separate relays according to a pre-determined schedule.

2. Accepts the lighting control schedule through a simple keyboard. In addition to the automatic schedule, control lighting circuit manually from the controller keyboard.

3. Provide monitoring of the system and display the ON/OFF state of each relay.

4. Capable of driving a standard printer.

a. CPU: PC class personal computer with memory, cables, and software, factory tested prior to shipment.

b. Include lighting control system operating software and current version of Windows operating system.

c. Include Trends and Relay Runtime Analysis software to allow the owner to analyze the operation of specific areas and identify those exceeding normal runtimes. Individual relays may be assigned a kWh weighted value or simply analyzed on a runtime basis. In both cases, the relays may be assigned to logical groups and plotted for the last 30 days or 12 months.

B. Relay/Transceiver Cabinets:

1. Code gauge steel cabinets, surface, with cover and following interior devices.

a. 20A, relays with 24V, 2 or 3 wire control, quantities as scheduled with space for 32 minimum.

b. Plug-in modular electronics to operate multiple relays as schedules, individually or in groups as directed by the controller.

c. Plug-in modular electronics for inputs which will notify the controller of change in input.

d. Terminals for system wiring.

e. Transceivers for input output control.

C. Wire:

1. Data line, 18 AWG minimum size, shielded twisted pair, stranded copper, color coded, 300V minimum insulation. Twist wires every 3-inches or less.

2. Wiring from low voltage switches or other controlling devices to the transceivers inputs and wiring from transceivers to remote mounted relays 18 AWG minimum, stranded copper, color coded, 300V minimum insulation. Multiconductor cable assembly may be used at contractor's option.

D. Low Voltage Switch Modules:

1. Master:

a. G.E.

b. RMP2-35-RK1 with RS2-37P switches

c. Or approved.

2. Single:

a. G.E. RP2-117 with RS2-37P switches

b. Or approved.

PART 3 EXECUTION

3.1 DRAWINGS

A. Installation and record drawings called for under submittals consists of reproducible drawings with outlets, devices, terminal cabinets, conduits and wiring shown. Prints of these drawings submitted for approval prior to starting installation. Upon request, the Architect will furnish reproducible floor plans as required for the contractor's use in developing the Installation and Record Drawings.

B. Submit drawings when approved and form the basis for installation.

C. Incorporate at the completion of the work deviations from the installation drawings on the reproducibles to indicate as built conditions. Submit drawings as Record Drawings for the system.

3.2 INSTALLATION

A. Install systems for each section of each floor and connect lighting circuits per relay schedule on drawings.

B. Area control switches able to manually provide 2-level control of lights by area.

C. Provide conduit for wiring, 1/2 inch minimum size.

D. Components for cabinets factory installed.

E. Install cabinets plumb, adjacent to serving lighting panel in electrical rooms as shown on the Drawings.

3.3 INSTRUCTION

A. Without additional expense to the Owner, competent authorized representative personnel gives instruction for the care, adjustment, and operation of all parts of the system to the Owner's representative who is to have charge of the equipment.

B. Each instructor thoroughly familiar with parts of the installation and trained in operating theory as well as in practical operation and system maintenance.

C. Furnish 16 hours of instruction after final acceptance of the system at the dates and times selected by the Owner.

D. Installation, start-up, and maintenance assistance available from the manufacturer on an as-needed basis.

END OF SECTION

WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Line Voltage Wall Switches
2. Receptacles
3. Plates

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 26, Grounding and Bonding for Electrical Systems

E. Section 26 05 33, Raceways and Boxes for Electrical Systems

F. Section 26 05 53, Identification for Electrical Systems

G. Section 26 05 80, Electrical Testing

H. Section 26 09 23, Lighting Control Devices

1.3 SUBMITTALS

A. Product Data

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Line Voltage Wall Switches:

1. Hubbell
2. Leviton
3. Arrow-Hart
4. Pass & Seymour

B. Receptacles:

1. Use same manufacture as the Line Voltage Wall Switches.

2. Hubbell

3. Leviton

4. Arrow-Hart

5. Pass & Seymour

C. Plates:

1. Hubbell

2. Leviton

3. Arrow-Hart

4. Pass & Seymour

2.2 MATERIALS

A. Extra heavy duty grade wiring devices, with special devices as noted on the Drawings. Should the Drawings indicate a device other than those listed. Device of same grade and manufacture as specified below. Furnish a matching plug connector for special purpose devices that do not have the common 120V NEMA 5-20R configuration.

B. Lighting switches and duplex receptacles installed have similar appearance characteristics unless noted otherwise.

2.3 LINE VOLTAGE WALL SWITCHES

A. Line Voltage Switches:

1. 20A rated, 277V, quiet type, extra heavy duty, heavy duty nylon toggle handle, back, and side wired with screw terminal connections.

2. As noted on the drawings provide:

a. Pilot light switch: lighted clear toggle.

b. Momentary Contact Switches: 15A, SPDT, center off.

c. Key Switches: 20A, 277V, back and side wired with screw terminal connections.

B. Except as noted herein, device exposed finish color as follows:

1. Normal Power: as selected by Architect.

2. Emergency Power: Red

3. Standby Power: Red

2.4 RECEPTACLES

A. Standard Straight Blade Duplex Receptacle:

1. 3-wire, 2-pole with grounding, extra heavy duty, 20A rated, NEMA 5-20R configuration, back and side wired with screw terminal connections.

a. Provide tamper-resistant for all general public spaces per NEC and local codes..

b. Provide isolated ground as noted on the drawings or NEC required.

c. Provide surge suppression receptacles as noted on the drawings.

2. Ground Fault Interrupting straight blade duplex receptacle:

a. Heavy duty, 3-wire, 2 pole with grounding, self-testing, green “ON” LED to indicate power, red “ON” LED to indicate ground fault condition, 20A rated, NEMA 5-20R configuration, back and side wired with screw terminal connections.

(1) Provide tamper-resistant for all general public spaces per NEC and local codes.

(2) Provide weather-resistant rating at exterior locations as required by NEC.

B. Special Purpose Receptacles: As noted on Drawings with NEMA configurations.

C. Exposed Device Color, unless otherwise noted, is as follows:

1. Normal power: as selected by Architect.

2. Emergency Power: Red

3. Standby Power: Red

4. Isolated Ground: Orange

5. Surge Suppression: Blue

2.5 PLATES

A. Flush Finish Plates:

1. As selected byArchitect.

2. 0.04-inch thick, Type 302 stainless steel, brush finish.

B. Surface Covers:

1. Galvanized or cadmium plated steel, 1/2-inch raised industrial type with openings appropriate for device installed.

C. Identification:

1. Identify receptacle plates with a pre-printed label indicating serving panel and branch circuit number.

2. Refer to Section 26 05 53, Identification for Electrical Systems.

PART 3 EXECUTION

3.1 INSTALLATION

A. Devices and finish plates installed plumb with building lines. Install wall mounted receptacles vertically at centerline height shown on the Drawings.

B. Finish plates and devices are not installed until final painting is complete. Scratched or splattered finish plates and devices will not be accepted.

C. Switches, receptacles and/or other devices ganged into a common enclosure provided with a separation barrier between devices where the combined circuit voltages within the enclosure exceeds 300V.

D. Provide GFCI receptacles as shown on the drawings or as NEC required. Provide a GFCI type duplex receptacle in each required location, do not sub-feed normal receptacles downstream of the GFCI receptacle to obtain the GFCI rating.

E. Provide receptacles with GFCI, tamperproof, weather-resistant grade ratings as shown on the drawings, appropriate for the installation or required by NEC.

3.2 CORD CAPS

A. Special plugs provided with the receptacles given to the Owner in their cartons with a letter stating the date and the Owner’s representative that received the materials.

3.3 COORDINATION

A. Electrical Drawings indicate the approximate location of devices. Refer to Architectural elevations, sections, and details for exact locations.

B. Coordinate with equipment installer the locations and methods of connection to devices mounted in cabinets, counters, work benches, service pedestals, and similar equipment.

3.4 TESTING

A. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct defective wiring.

END OF SECTION

CENTRAL BATTERY EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Provisions of Division 26, Electrical Section 26 0500, Common Work Results for Electrical, apply to this Section.

1.2 SUMMARY

A. This Section includes:

1. Emergency Power Supply
2. Controls
3. Battery Charger
4. Storage Batteries
5. Cabinet
6. Ratings

B. Provide a battery operated emergency power system to operate exit lights, stair lights, selected area lights and other equipment as indicated.

C. Under normal operation, the system will act as a 24-hour security and night lighting system.

D. Upon normal power failure, switching equipment will automatically connect the power source to the emergency system.

E. Upon resumption of normal power, the load automatically switched back to the normal source.

F. Related Sections include:

1. Section 26 0519, Low Voltage Electrical Power Conductors and Cables
2. Section 26 0526, Grounding and Bonding for Electrical Systems
3. Section 26 0529, Hangers and Supports for Electrical Systems
4. Section 26 0533, Raceways and Boxes for Electrical Systems
5. Section 26 0553, Identification for Electrical Systems

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. UL 924 Emergency Lighting and Power Equipment

2. NEC 700 and 701 National Electric Code

1.4 SUBMITTALS

A. Shop Drawings

B. Product Data

C. Operating and Maintenance Data:

1. Complete instructions covering the operation and testing of the emergency power system.

2. Maintenance instructions to include complete trouble shooting and diagnostic information, disassembly instructions, assembly instructions and preventive maintenance schedule.

3. Include data in Operating and Maintenance Manuals.

1.5 WARRANTY

A. Include with the power supply submittal drawings a warranty of one year on the central battery equipment unit and a separate 10-year warranty on life and performance on the battery supplied by the battery manufacturer. The warranties shall be written on the manufacturer's letterhead and signed by a corporate officer.

B. Warranty includes the following:

1. Equipment complies with the latest adopted National Electrical Code.

2. The complete assembly will provide its full rated output under normal operation for 90 minutes at any time throughout the 10-year warranty period.

3. Indicate the battery manufacturer and warrant each individual battery for 10 years under normal operation. A battery will be considered to have failed when it does not provide 80 percent of its initial ampere-hour capacity.

4. Each power supply factory tested under full load operating conditions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Philips Chloride

1. Myers

2. Exide

3. Lithonia

4. Perfect Power

5. Crucial Power Products

6. Hubbell - Dual Lite

B. Other Manufacturers: Submit substitution request.

2.2 EMERGENCY POWER SUPPLY

A. Inverter system rated for LED, HID, Incandescent and Fluorescent lighting loads and provide full output for 90 minutes of operation.

B. The inverter power supply EPS rated as shown on the drawings at the indicated power sourceinput/output, 60Hz. The power supply shall consist of output power modules, battery pack, battery charger, transfer module, required sensing devices, and control panel.

C. Output power modules shall consist of solid state inverters and power transformer. The power module shall be equipped with surge protection and be current limiting to 110% of full load continuing to deliver power to the emergency system until removed from the line. The output shall be an alternating 60 Hz waveform with 5% frequency stability. Output voltage shall not vary more than 10 percent from no load to full load for battery voltages from 100% to low voltage cut-off.

D. Transfer module solid-state design and automatically transfer the emergency system loads to the output power modules within 500 milliseconds of normal power failure. Upon restoration of normal power, provide a delay of return to normal power to assure an in-phase transfer. In the event of a prolonged outage, the power modules will be removed from the line when the batteries discharge to nominally 87 percent of full charge voltage.

E. Provide with the following features: overload capacity of 125 percent for 5 minutes, low voltage battery disconnect, short circuit proof, current limiting, fused battery circuit, reverse polarity, brownout protection.

F. Provide with a main input circuit breaker with lockable provisions and rated for the available fault current, 10 KAIC minimum for 120vac input Provide output single pole circuit breakers rated for 20 A . Refer to panel schedules on drawings for further information.

2.3 CONTROLS

A. Microprocessor Control Unit:

1. Instruments, controls, indicating lights and LCD display screen factory mounted on the front of the cabinet for easy monitoring and operation without requiring access to the interior.

2. Control panel contains AC line switch, charging indicating light, test switch, AC output voltmeter, DC voltmeter, DC ammeter,. When fuses or breakers are used to protect components, visual alarms provided on the control panel to indicate tripped conditions.

3. Automatic monthly and annual self-testing ability.

4. Continuous self-diagnostic and self- testing system.

5. Provide with the following alarm functions: high/low battery charger fault, near low battery, low battery, load reduction fault, output overload, high/low AC input volts, high ambient temperature, inverter fault, output fault and circuit breaker trip.

6. Class C auxiliary contacts to indicate when unit has transferred to the battery source.

2.4 BATTERY CHARGER

A. Battery charger module solid state microprocessor controlled, capable of fully recharging the batteries within listed UL requirements.

B. Charger constantly monitors the batteries, providing automatic discharge and charge only when needed.

C. Internally protect against short circuits and automatically recover to charge batteries when the fault is removed.

2.5 STORAGE BATTERIES

A. Sealed, maintenance free lead-calcium type, series and parallel connected, with a warranted life of 10 years.

B. Battery cases impact resistant with vapor-tite removable caps and lead connectors integrally molded into the cover.

C. .

D. Rated for an operating temperature limits of a minimum 32 degrees F and maximum of 100 degrees F.

2.6 CABINET

A. Mount components in one or more freestanding metal cabinets of sufficient strength to handle the weight of the components.

B. Durable finish, factory applied, NEMA 1 rating, 14 gauge steel with hinged lockable doors.

C. Provide either a cabinet for combined inverter unit with battery storage or separate inverter and battery cabinets, depending upon unit rating.

2.7 RATINGS

A. Entire unit UL listed and labeled and meet the following listings:

1. UL 924 Underwriters Laboratories, Standard for Safety of Emergency Lighting and

2. Power Equipment

3. NFPA 101 National Fire Protection Association, Life Safety Code

4. NFPA 70 National Fire Protection Association, National Electrical Code (NEC)

5. NEC National Electrical Code

6. OSHA Occupational Safety and Health Administration

PART 3 EXECUTION

3.1 INSPECTION

A. After the equipment has arrived at the job site, the Owner (or the owners representative), Contractor, and Manufacturer's Representative will perform a visual inspection for physical damage and compare nameplate data with drawings and specifications. Manufacturer to correct problems encountered.

3.2 INSTALLATION

A. Install the emergency power supplies as per manufacturer's recommendations and as shown on the Drawings.

B. Provide seismic anchoring/restraints of all cabinets, refer to Section 26 05 29, Hangers and Supports for Electrical Systems.

3.3 FIELD QUALITY CONTROL

A. Perform the following inspections and test procedures by factory-trained field service personnel prior to equipment system start-up:

1. Visual Inspection:

a. Inspect equipment for signs of damage.

b. Verify installation per drawings.

c. Inspect cabinets for foreign objects.

d. Verify neutral and ground conductors are properly sized and configured.

e. Inspect cell cases.

f. Inspect each cell for proper polarity.

g. Verify printed circuit boards are configured properly.

2. Mechanical Inspection:

a. Check control wiring connections for tightness.

b. Check power wiring connections for tightness.

c. Check terminal screws, nuts, and/or spade lugs for tightness.

3. Electrical Inspection:

a. Check fuses for continuity.

b. Confirm input voltage and phase rotation is correct.

c. Verify control transformer connections are correct for voltages being used.

d. Assure connection and voltage of the battery string(s).

3.4 UNIT START-UP TESTING

A. Provide factory trained field service personnel to perform the following functional testing operations during start-up the unit:

1. Energize control power.

2. Perform control/logic checks and adjust to meet specification.

3. Verify DC float and equalize voltage levels.

4. Verify DC voltage clamp and overvoltage shutdown levels.

5. Verify battery discharge, low battery warning and low battery shutdown levels.

6. Verify fuse monitor alarms and system shutdown.

7. Verify inverter voltages and regulation circuits.

8. Verify inverter/bypass sync circuits and set overlap time.

9. Perform manual transfers and returns.

10. Simulate utility outage.

11. Verify proper recharge.

3.5 MANUFACTURER'S FIELD SERVICE

A. Service Personnel

1. Nationwide service organization, consisting of factory-trained field service personnel dedicated to the start-up and maintenance of central battery equipment.

2. Provide a national dispatch center to coordinate field service personnel schedules. One toll-free number shall reach a qualified support person 24 hours/day, 7 days/week, 365 days/year. If emergency service is required, telephone response time shall be 20 minutes or less and on-site response time shall be four hours or less.

3. Assign two local customer engineers to the site with a regional office as a backup.

END OF SECTION

LIGHTING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Lamps and Sockets
2. Power Supplies
3. Emergency LED Drivers
4. Transformers
5. Track Lighting Systems
6. Custom Luminaires
7. Exterior Luminaires
8. Extra Material
9. Disposal and Replacement

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 26, Grounding and Bonding for Electrical Systems

E. Section 26 09 23, Lighting Control Devices

F. Section 26 09 33, Central Dimming Controls

G. Section 26 27 26, Wiring Devices

1.3 DEFINITIONS

A.	BACNET	Protocol for integration with BAS/BMS/EMS
B.	BAS / BMS / EMS Management System	Building Automated System, Building Management System, Energy
C.	CCT	Correlated Color Temperature
D.	CRI	Color Rendering Index
E.	CS	Control Station

F. D Dimming Wall Switch

G. DT Dual Technology (PIR + U)

H. FC Footcandles

1. The metric for measuring illuminance light levels

I. GUI Graphic User Interface

J. LCP Lighting Control Panel

K. LED Light Emitting Diode

L. LonWorks Protocol for integration with BAS/BMS/EMS

M. MTBF Minimum Time Between Failures

1. Total hours of testing / Number of failures

N. OS/VS Occupancy Sensor / Vacancy Sensor,

1. Occupancy sensors provide automatic on and automatic shut-off.

2. Vacancy sensors provide automatic shut-off only, and require manual-on.

O. PC Photocell

P. PIR Passive Infrared Technology

Q. Power Supply Ballasts and LED drivers

R. RS RS-232 Connection for AV Integration

S. SC Scene Control

T. TC Timeclock, or astronomical timeclock

U. U Ultrasonic Technology

V. WS Wall Switch

W. WS/O Wallbox Occupancy Sensor Switch

1. Wall Switch with integrated Occupancy Sensor

1.4 QUALITY ASSURANCE

A. The lighting design for this project was based on luminaire types and manufacturers as specified.

B. Basis of Design manufacturers are pre-qualified to bid on products where specified. Inclusion of manufacturer and product series does not relieve specified manufacturer from providing product as described in luminaire schedule; modifications to standard product, if required, include with initial bid.

C. Alternate manufacturers listed in the Luminaire Schedule do not require prior approval but included with the shop drawing submittal. Inclusion of manufacturer and product series as an alternate does not relieve the manufacturer from providing product equivalent to the basis of design as described in luminaire schedule; modifications to standard product, if required, include with initial bid.

D. Or Approved or Pre-Bid Approved Equal:

1. Submit Substitution Request prior to bid, complying with requirements of Division 01, General Requirements.

2. Approval determined by review of the following luminaire characteristics where applicable. Lack of pertinent data on characteristic constitutes justification for rejection of the submittal.

a. Performance:

(1) Distribution

(2) Utilization

(3) Average brightness/maximum brightness.

(4) Spacing to mounting height ratio.

(5) Visual comfort probability.

b. Construction:

(1) Engineering

(2) Workmanship

(3) Rigidity

(4) Permanence of materials and finishes.

c. Installation Ease:

(1) Captive parts and captive hardware.

(2) Provision for leveling.

(3) Through-wiring ease.

d. Maintenance:

(1) Relamping ease.

(2) Ease of replacement of ballast and lamp sockets.

e. Appearance:

(1) Architectural integration.

(2) Light tightness.

(3) Neat, trim styling.

(4) Conformance with design intent.

1.5 GENERAL REQUIREMENTS:

A. Provide lighting outlets indicated on the Drawings with a luminaire of the type designated and appropriate for the location.

B. Where a luminaire type designation has been omitted and cannot be determined by the Contractor, request a clarification from the Architect in writing and provide a suitable luminaire type as directed.

C. Coordinate installation of luminaires with the ceiling installation and other trades to provide a total system that is neat and orderly in appearance.

D. Luminaires located in fire rated assemblies rated for use in such assemblies or have assembly maintained by the installer through the use of appropriate construction techniques to maintain the assembly rating. It is the responsibility of the contractor to maintain the assembly rating and provide required components during construction. Coordinate luminaires impacted with Division 01, General Requirements, and life safety documents.

E. Install remote power supplies and transformers in enclosures as required by luminaire specified. Locate remote power supplies and transformers as shown on drawings; where no location is shown, provide recommendation for approval prior to commencing field installation. Remote mounted power supplies and transformers located within the distance limitations specified by the manufacturer.

F. Exterior pole lights have an appropriated pole base as part of the assembly. For pole lights in pedestrian areas, use a flush pole base. Pole lights in parking areas a raised base used. Pole bases, footings, and structural components reviewed and approved by a state licensed structural engineer prior to ordering and installation.

G. Linear lighting elements installed on building exterior, in coves, soffits, panels and other architectural materials are the longest sections available to meet the intent of the design and centered in the available space. Other items required to make the lights function installed out of site and coordinated with Architect, Landscape Architect, Lighting designer and Electrical engineer of record. Transformers, drivers, and ballasts in suitable enclosures. Required connection points are the minimum box or connector available from the manufacturer. No standard electrical boxes are allowed to produce linear runs in architectural coves. Ancillary material required is concealed from view. Coordinate final ceiling material, dimensions, and limitations with the ceiling manufacturer prior to ordering and installation.

H. Coordinate voltage requirements to each luminaire as indicated on drawings.

I. Verify luminaires carry a valid UL or ETL listing. Luminaires located in outdoor locations carry and appropriate wet or damp listing as required for the mounting application.

J. Procure luminaires through a distributor located within 200 miles of the project site with a valid business license in the state the project is located.

K. Upon request of the Architect, Engineer, or Owner, provide back-up pricing in a unit cost breakdown per luminaire. Back-up pricing includes distributor net pricing, contractor net pricing, final owner pricing and mark-ups and discounts (lot price or all-or-none) associated with the luminaires.

L. Lighting related change orders include back-up pricing noted above for review by the engineer and lighting designer.

M. Provide manufacturer's warranty covering 5 years on drivers from date of purchase. Luminaire manufacture to operate driver at or below the required driver warranty temperature. Luminaire manufacturers failing to operate the driver, at the project required ambient temperature, within the driver manufacturer warranty parameters will be responsible for driver warranty related costs over the warranty period.

N. Minimum 80 percent of the luminaire material by weight should be recyclable at end of life. Design luminaire for ease of component replacement and end-of-life disassembly.

1.6 SUBMITTALS

A. Submit the following in accordance with Section 26 05 00, Common Work Results for Electrical:

1. Shop Drawings, to include:

a. Product Data.

(1) Provide manufacturer's published product data information.

(2) This information is to be relevant to the specified product only.

(3) Submittals limited to not more than three sheets for each type specified.

(4) They are specifically not to have configurations available included for review.

(5) Submittals that contain information that is not relevant to the product specified will be rejected in total and resubmission will be required.

b. Luminaire dimensions on a fully dimensioned line drawing.

c. Lamp information, including array configuration:

(1) For LED lamps: proof of conformance with the following: ANSI C78.377-2015, IES LM 79-2008, IES LM 80-2008, IES LM 82-2012, IES LM 84-14, IES LM 85-14, IES TM 21-2011, IES TM 28-14 and special certifications required by the contract documents.

d. Lamp socket information.

e. Power supply and transformer information using ballast manufacturers published product data information. Multiple power supplies or transformers may be submitted for single luminaire if compatible with specification included in contract documents. Include certification of lamp and power supply and transformer compatibility for submitted.

f. Mounting details including clips, canopies, supports, and methods for attachment to structure. Provide equipment required for row configurations.

g. UL/ETL Labeling Information

h. Manufacturer's Warranty

i. Photometric Reports consisting of the following:

(1) Candlepower distribution curves: Provide five plane candlepower distribution data at no more than 5 degree vertical angle increments.

(2) Coefficient of utilization table.

(3) Zonal lumen summary including overall luminaire efficiency.

(4) Luminaire luminance: Provide measured maximum brightness data for luminaires with reflectors and average brightness data for luminaires with refractors.

(5) Spacing to mounting height ratio. If parallel and perpendicular ratios differ, provide data on each plane.

(6) Pole information to include maximum supported effective projected area (EPA) and weight for the design wind speed, as well as structural calculations for each pole proposed.

(7) VCP calculations (where applicable): For general office lighting luminaires, provide typical VCP calculations for ceiling heights between 9-feet and 12-feet at 1-foot increments, for room sizes 20-feet by 20-feet and 30-feet by 30-feet.

j. Special requirements of the specification.

2. Operation and Maintenance Data:

   a. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hard-cover binder for review. After review, Architect will deliver one copy to Owner.

      (1) One complete set of final submittals of actual product installed, including product data and shop drawings. Include product data for actual power supply and transformer installed where applicable.

      (2) List of lamps used in Project, cross-referenced to fixture types, with specific manufacturer's names and ordering codes.

      (3) Re-lamping instructions for lamps that require special precautions (LED, tungsten halogen, metal halide, etc.).

      (4) Lighting fixture cleaning instruction, including chemicals to be used or avoided.

      (5) Parts list of major luminaire components and ordering information for replacement

      (6) Copies of manufacturer warranties on product.

3. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.

4. Manufacturer's Installation Instructions:

   a. Indicate application conditions and limitations of use stipulated by product testing agency.

   b. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

5. Closeout Submittals:

   a. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

   b. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

   c. Maintenance Materials: Furnish for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.1 GENERAL

A. Luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.

B. Luminaire assemblies UL listed.

C. Luminaires UL listed appropriate to mounting conditions and application.

D. Recessed luminaires installed in fire rated ceilings and using a fire rated protective cover thermally protected for this application and carry a fire rated listing.

E. Luminaires installed under canopies, roofs, or open areas and similar damp or wet locations UL listed and labeled as suitable for damp or wet locations.

2.2 LENSES

A. Mechanically secured from within the housing.

B. Interior linear prisms with smooth exterior.

C. Prismatic Acrylic:

1. As specified in the Luminaire Schedule.

D. Suspension Devices, type as specified in the Luminaire Schedule:

1. Aircraft Cable:

a. Stainless steel type - 3/32-inch nominal diameter, stranded, with positive pressure, field adjustable clamp at fixture connection.

2. Rigid Pendant:

a. 1/2-inch nominal diameter or as specifically shown on drawings.

b. Supplied by fixture manufacturer when available as standard product.

c. At fixture end of stems, provide earthquake type swivel fitting to permit 45 degree swing in any direction away from vertical.

d. Flat canopy to permit splice inspection after installation.

3. Chain Hangers:

a. Length to suit fixture mounting height if shown or as field conditions dictate.

b. Use two heavy duty chains with S hooks at each suspension point.

c. Length to suit mounting height as shown on Drawings.

4. Suspension system must permit ±1/2-inch minimum vertical adjustment after installation.

E. Supports:

1. Provide internal safety cable from fixture body to structure.

2. Carry fixture weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code.

F. Feed Point:

1. Flat-plate canopy to cover outlet box, with holes for support cable and power cord, concealed fasteners to permit splice inspection after installation.

2. At the electrified connection provide straight cord feed. Provide a separate feed point where emergency feed is required.

3. Power Cord:

a. White multi-conductor cord, parallel to support cable (aircraft cable); within pendant (rigid pendant); or flexible conduit (chain hanger).

4. Provide a separate fee point where emergency feed is required.

G. Non-feed Points:

1. 1/2-inch OD polished chrome end sleeve, inside threaded 1/4-inch-20, with 2 –inch diameter. Flat white plate to cover hole in ceiling. Top of cable with ball swaged on end, to fit inside sleeve.

2. Provide support above ceiling as required.

H. Suspension method allows adjustment to be made in hanging length to allow for variance in ceiling height.

I. Exposed paintable suspension components have the same finish and color as the luminaire housing.

2.3 LAMPS AND SOCKETS

A. Lamp each luminaire with the suitable lamp cataloged for the specific luminaire type and as indicated by the manufacturer, or as specifically indicated in the Luminaire Schedule, or as specified herein.

B. Lamps to be field replaceable.

C. Lamp sockets to be of configuration and design to accept standard LED lamps and circuit boards.

D. LED lamps to meet or exceed 50,000 hours as defined by LM-80-08 based on both the ambient temperature listed and the LEDs B10L70 performance curve as published by the LED lamp manufacturer.

E. LED lamps to be high brightness and proven quality from established and reputable LED manufacturers, including:

1. Nichia

2. Osram-SemiOpto

3. Cree
4. Philips Lumileds
5. Seoul Semiconductor
6. Bridgelux
7. General Electric Gelcore
8. Xicato
9. Osram

F. Replacement Lamps

1. Sorra
2. Toshiba

G. LED lamps that are integral into the housing; light bars, diodes, boards and other, to be rated and tested for use in the fixture specified and compatible with the driver tested and compatible with that fixture.

H. Screw-In Base Replacement LED Lamps

1. Manufacturer to provide wattage restriction label on socket, equivalent to specified wattage on LED replacement lamp.
2. LED replacement lamps not to be placed in air-tight enclosures or in insulated air tight (ICAT) rated luminaire enclosures without dedicated heat dissipation and thermal management of the luminaire system.

I. Color Rendering Index (CRI):

1. 80 or higher for ambient lighting in common spaces
2. As indicated in the luminaire schedule

J. Color Rendering Index (CRI): 90+ per ANSI C78.377-2008/CIE 13.3-1995 unless noted otherwise on the luminaire schedule.

K. Correlated Color Temperature (CCT) per luminaire schedule.

1. Color consistency not to exceed a +/- tolerance of greater than two MacAdam Ellipses over the life of the luminaire.

L. Adjustable Lamp Mechanisms: To have aiming stops which can be permanently set to position lamp vertically and rotationally.

M. High power LED luminaire thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, and/or internal monitoring firmware

N. Operating Temperature: -22 degrees F to 115 degrees F.

1. Operate below manufacturer's published die junction temperatures when operated at 1W at 350 mA in an elevated ambient of 46 degrees C.

O. Utilize quick-connect connections to replaceable boards to meet ANSI and UL/ETL and NEMA requirements.

2.4 POWER SUPPLIES

A. UL recognized under the component program and modular for simple field replacement.

B. Rate for use with the LED array specified.

1. Warranty array and driver as an assembly.

2. 5 year full replacement, non-pro-rated warranty is required on electronic components.

C. Luminaires requiring more than one driver are not permitted, unless specified in the luminaire schedule.

D. Power supplies used in enclosed and gasketed luminaires listed for use in wet locations, Type 1 construction.

E. Rate for the expected ambient temperature in which they are installed.

1. Exterior installed power supplies rated to start the lamps at 0 degrees F.

F. Operate for a (+/- 10 percent) supply voltage of 120V through 277VAC at 60Hz.

G. Power Factor: 0.9 minimum

H. Lifetime minimum

1. 50,000 hours at full load and 77 degrees F ambient

2. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.

I. Minimum time between failures (MTBF) greater than 300,000 hours at full load and 77 degrees F ambient, in accordance with MIL-HDBK-217.

J. Driver and luminaire electronics deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10).

1. Flicker index to be less than 5 percent at frequencies below 1000 Hz.

K. Label systems using tandem wired luminaires be labeled accordingly. Locate label in the lamp compartment of each luminaire and identify the function of that luminaire. Do not make the label visible from room.

L. Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements at full output. At no point in the dimming curve allow imbalance current to exceed full output THD.

M. Meet or exceed $30mA^2s$ at 277VAC for up to 50Ws of load and 75A at 240us at 277VAC for 100 watts of load.

N. Withstand up to a 1,000V surge without impairment of performance as defined by ANSI C62.41 Category A.

O. Housing have circuit diagrams and lamp connections applied thereto.

P. Must be Reduction of Hazardous Substances (RoHS) compliant

Q. Provide no light output when the analog control signal drops below 0.5 V, or the DALI/DMX digital signal calls for light to be extinguished and consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

R. Support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:

1. Adjustment of forward LED voltage, supporting 3V through 55V.

2. Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1mA

3. Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.

S. Remote: Driver may be remote mounted up to 300-feet depending on power level and wire gauge.

T. Dimming Drivers:

1. Dimming power supplies controlled by a common controller provided by the same manufacturer.

2. Manufacturer to have minimum 5 years' experience in manufacturing of dimmable electronic lighting drivers.

3. LED dimming to be equal in range and quality to a commercial grade incandescent dimmer. Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in a commercial environment.

a. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.

4. Provide step-free, continuous dimming to black from 100 percent to 0.1 percent and 0 percent relative light output, or 100 – 1 percent light output and step to 0 percent where indicated. Driver responds similarly when raising from 0 percent to 100 percent.

    a. Driver to be capable of 20 bit dimming resolution for white light LED drivers or 15 bit resolution for RGBW LED drivers.

5. Track evenly across multiple fixtures at light levels, and provide input signal to output light level that allow smooth adjustment over the entire dimming range.

6. Limit inrush current.

7. No visible change in light output with a variation of plus/minus 10 percent line voltage input.

8. Ability to configure a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels

9. Basis of Design Product: eldoLED or subject to compliance and prior approval with specified requirements of this section, one of the following:

    a. eldoLED

    b. Philips

    c. Osram Sylvania

    d. Tridonic

    e. General Electric

10. Dimming Protocols:

    a. If not otherwise noted on the luminaire schedule, dimming LED drivers to be 0-10V.

    b. As indicated in the luminaire schedule.

2.5 EXTRA MATERIAL

A. Furnish extra materials described below that match product installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Glass and plastic lenses, covers, louvers, globes, guards, and other removable fixture parts: 5 percent or one dozen (whichever is less) of each type and rating installed. Furnish at least one of each type.

2. Control gear: 5 percent or one dozen (whichever is less) of each field-replaceable control module, driver, ballast, or individual fixture transformer. For fixtures with non-easily replaceable control gear provide 5 percent or one dozen (whichever is less) extra fixtures. Confirm non-replaceable products during submittal process.

3. Adjustable accent lights (track, recessed, or surface mounted): 10 percent of each beam angle lens (or removable lens accessory), 10 percent or one dozen (whichever is less) additional accessory lenses, color filters, louvers, and other accessories specified for use during final focusing.

4. For non-decorative LED lights, provide 2 percent additional fixtures, or minimum two fixtures.

2.6 DISPOSAL AND REPLACEMENT

A. LED manufacturer is responsible for the disposal of expired LED arrays and heat sinks. Clearly label fixture with return information, disposal procedures and manufacturer disposal contact information.

B. Owner will pay for shipping.

C. Manufacturer is required to inform the owner of new power requirements and /or lumen output values if new replacement components prior to shipping replacement parts.

D. Label disposal and replacement information inside the luminaire and in the project operation and maintenance manuals along with O&M requirements listed in Division 01, General Requirements.

PART 3 EXECUTION

3.1 INSTALLATION

A. Meet general requirements of NFPA 70, National Electric Code.

B. Mounting heights specified on drawings:

1. Wall Mounted Luminaires:

a. Centerline of luminaire.

2. Pendant Mounted Luminaires:

a. Bottom of luminaire unless specifically identified in the Luminaire Schedule or on drawings.

C. Support:

1. Support by separate means from the building structure and not from the ceiling system, ductwork, piping, or other systems.

2. Final decision as to adequacy of support and alignment will be given by the Architect.

D. Power Supplies:

1. Do not install equipment until following conditions can be maintained in spaces to receive equipment:

a. Ambient temperature: -4 degrees to 122 degrees F.

b. Relative humidity: Maximum 90 percent, non-condensing.

c. Protected from dust and excess moisture during installation.

2. Install per manufacturers prescribed methods.

3. Located remote mounted power supplies and transformers within the distance limitations specified by the power supply manufacturer.

E. Level luminaires, align in straight lines, and locate as shown on the architectural elevations and reflected ceiling plan.

F. Manufacturer's labels or monograms not visible after luminaire is installed, but must be included for future reference.

G. Recessed Luminaires:

1. Trims which fit neatly and tightly to the surfaces in which they are installed without light leaks or gaps.

2. Install heat resistant non-rubber gaskets to prevent light leaks or moisture from entering between luminaires trim and the surface to which they are mounted.

3.2 COORDINATION OF WORK

A. Architectural Reflected Ceiling Plans take preference as to the exact placement of the luminaires in the ceiling.

B. Determine ceiling types in each area and provide suitable accessories and mounting frames where required for recessed luminaires. Luminaire catalog numbers do not necessarily denote specific mounting accessories for type of ceiling in which a luminaire may be installed.

3.3 AIMING

A. Aim luminaires with proper lamps installed.

B. Aim directional luminaires, including but not limited to luminaires described in the Contract Documents or by the luminaire manufacturer as aimable, adjustable, or asymmetric as follows:

1. Provide the lighting pattern for which the luminaire is designed.

2. Provide the lighting pattern as shown on the drawings.

3. Predetermined aiming points as shown on the drawings.

4. Where aiming cannot be determined, request, in writing, clarification from the Architect, indicating luminaires needing clarification.

C. Re-aim luminaires as determined by Architect during final project walkthrough.

D. Install adjustable luminaires with dead zone of rotation away from intended aiming point

3.4 PROJECT CLOSEOUT

A. Leave luminaires clean at the time of acceptance of the work. If luminaires are deemed dirty by the Architect at completion of the work, clean them at no additional cost. Protective plastic wrap is to be removed from parabolic luminaires just prior to owner acceptance.

B. Provide fixtures with new lamps operating at time of final acceptance. Exception: For fluorescent dimming fixtures, provide minimum 100 hour/maximum 200 hour, continuously lit lamps or per ballast manufacturer's recommendations.

C. Where incandescent lamps are used for construction lighting, replace the lamps with new lamps just prior to occupancy by the owner.

END OF SECTION

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes Design-Build work.

B. Work included in Section 27 05 00 applies to Division 27, Communications work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of communications systems for proposed project:

C. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

D. Additional conditions apply to this Division including, but not limited to:

1. Specifications including General and Supplementary Conditions and Division 01, General Requirements.

2. Drawings

3. General provisions of the Contract

4. Addenda

5. Owner/Architect Agreement

6. Owner/Contractor Agreement

7. Codes, Standards, Public Ordinances and Permits

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 27, Communications

C. Section 26 05 33, Raceways and Boxes for Electrical Systems\

1.3 REFERENCES

A. References, Codes and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 27 Sections and those listed in this section.

B. Supervisors and Lead Installers:

1. Working knowledge and understanding of the following documents and codes or their most recent updates and familiar with the requirements that pertain to this installation.

2. Installers familiar with and have practical working knowledge of the requirements that pertain to this installation.

C. Codes:

1. Comply with applicable sections of the most recent editions and addenda of following for interior and exterior installations.

2. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

a. IBC International Building Code

b. NEC/NFPA 70 National Electrical Code

c. NEXC IEEE National Electrical Safety Code

3. State of Oregon:

a. OAR Oregon Administrative Rules

b. OESC Oregon Electrical Specialty Code

c. OFC Oregon Fire Code

d. OSSC Oregon Structural Specialty Code

e. OEESC Oregon Energy Efficiency Specialty Code

f. Oregon Elevator Specialty Code

D. Standards:

1. Comply with applicable sections of the most recent editions and addenda of the following for installations and testing of communications cabling, connectors, and related hardware.

2. Reference standards and guidelines include but are not limited to the latest adopted editions from the following:

a. ANSI American National Standards Institute

b. NEMA National Electrical Manufacturers Association

c. TIA Telecommunications Industries Association

(1) TIA TSB-125 Guidelines for Maintaining Optical Fiber Polarity Through Reverse-Pair Positioning

(2) TIA TSB-140 Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems

(3) TIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7

(4) T-526-14-A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – SFSTP-14

(5) ANSI/TIA-568.0-D Generic Telecommunications Cabling for Customer Premises

(6) ANSI/TIA-568.1-D Commercial Building Telecommunications Cabling Standard Part 1: General Requirements

(7) ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard—Part 2: Balanced Twisted Pair Cabling Components

(8) ANSI/TIA-568-3-D Optical Fiber Cabling Components Standard

(9) ANSI/TIA-569-C Commercial Building Standards for Telecommunications Pathways and Spaces

(10) ANSI/TIA-598-C Optical Fiber Cable Color Coding

(11) ANSI/TIA-604.2-A FOCIS 2—Fiber Optic Connector Intermateablility Standard

(12) ANSI/TIA-606 Administration Standard for Commercial Telecommunications Infrastructures

(13) ANSI/TIA/607-C Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

(14) ANSI/TIA-758-A Customer-owned Outside Plant Telecommunications Infrastructure Standard

(15) ANSI/TIA-854 A Full Duplex Ethernet Specification for 1000 Mb/s (1000BASE-TX) Operating over Category 6 Balanced Twisted-Pair Cabling

(16) ANSI/TIA-862-B Structured Cabling Infrastructure Standard for Intelligent Building Systems

(17) ANSI/TIA-4994 Standard for Sustainable Information Communications Technology

(18) ANSI/NECA/BICSI 568-2006 Standard for Installing Telecommunications Systems

d. Other Reference Materials

(1) ANSI/NECA/GICSI-568-2006, Standard, Installing Commercial Building Telecommunications Cabling

(2) COOSPBICSI - Outside Plant Design Reference Manual

(3) ESSDRM BICSI - Electronic Safety and Security Reference Manual

(4) ITSIM BICSI - Information Transport Systems Installation Methods Manual

(5) NDRM BICSI - Network Design Reference Manual

(6) TDDM BICSI - Telecommunications Distribution Methods Manual

(7) WDRMBICSI - Wireless Design Reference Manual

(8) IEEE Institute of Electrical and Electronic Engineers

(9) NEMA National Electrical Manufacturers Association

(10) UL Underwriters Laboratories Cable Certification and Follow Up Program

(11) ASA American Standards Association

1.4 QUALITY ASSURANCE

A. Perform work in accordance with contract documents and governing codes and standards.

B. Personnel performing the work of this Section thoroughly familiar with the cabling methods set forth in the latest release of the TDMM.

C. RCDD reviews required work prior to commencing. Oversee the installation and will have the end responsibility for the quality of the installation work performed. Submitted designs and or changes to the design must be approved and signed off by the RCDD.

D. Installed cabling systems not to generate nor be susceptible to harmful electromagnetic emission, radiation, or induction that degrades cabling systems.

E. Expansion Capability: Unless otherwise indicated, provide spare positions in wall fields, cross connects, and patch panels, as well as space in distribution and riser pathways to accommodate minimum 15 percent future growth.

F. Backward Compatibility: The provided solution backward compatible with lower category ratings such that if higher category components are used with lower category components, the permanent link and channel measures meet or exceed the lower channel's specified parameters.

G. Component Compliance: The provided solution's components each meet the minimum transmission specifications listed herein such that no individual component will be less than specifications for permanent and channel, regardless of the fact that tests for permanent and channel ultimately meet required specifications.

H. Visibly damaged goods are to be returned to the supplier and replaced at no additional cost to the Owner.

1.5 CONTRACTOR RESPONSIBILITY AND QUALIFICATIONS

A. Provide components, materials, services, and labor essential for a complete and functional structured cabling system.

B. Comply with local, state, and federal laws and regulations applicable to the work to be performed although said law, rule, or regulation is not identified herein.

C. Examination of building and site responsibility:

1. Examine site and building prior to installation to determine conditions affecting the scope of work.

2. Contact Owner representative for arrangements.

3. Systems and cabling are assumed working and in good condition unless Contractor documents exceptions.

D. Respect and protect the privacy and confidentiality of Owner, its employees, processes, products, and intellectual property to the extent necessary, consistent with the legal responsibilities of the State of Oregon and Owner policies.

E. Use of Sub-Contractors:

1. Inform in writing to Owner's representative and General Contractor about the intention to use sub-contractors and the scope of work for which they are being hired.

2. Owner's representative prior to the sub-contractor's hiring and start of work must approve the use of sub-contractors in writing.

F. Provide a sufficient number of technicians for this project to stay on schedule.

G. Contractor Qualifications:

1. Fully conversant and capable in the cabling and equipment installation of communications systems including, but not limited to:

a. Data/Voice Structured Cabling

b. Audio and Video System Types

2. Minimum of five years' experience in the design, installation, testing, and maintenance of communications systems.

3. Must employ at least one full time BICSI certified RCDD who is involved in reviewing work performed by contractor on this project.

4. Verification of current BICSI Certified Installer, or equivalent.

5. Personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.

6. Installers: Only technicians certified by approved equipment manufacturer are approved.

7. Maintain a local service facility which stocks spare devices and/or components for servicing systems.

8. Have performed successful installation and maintenance of at least three projects similar in scope and size. Provide project references for these three projects, including scope of Work, project type, Owner/user contact name and telephone number.

1.6 MANUFACTURERS

A. Equipment in these Sections are the standard products of a manufacturer regularly engaged in the manufacture of such products unless specified otherwise. Components used in the system commercial products that comply with these Specifications.

B. Each component of equipment identifies the manufacturer's name, model, and applicable serial number. The Owner's authorized representative retains the right to reject products that reflect, in their opinion, sub-standard design practices, manufacturing procedures, support services, or warranty policies.

1.7 CHANGE ORDERS

A. Supplemental cost proposals by the Contractor accompanied with a complete itemized breakdown of labor and materials. At the Architect's request, Contractor's estimating sheets for the supplemental cost proposals made available to the Architect.

B. Separate and allocate labor for each item of work.

1.8 WARRANTY

A. The chosen Communications Contractor provide a minimum 1 year warranty on material, installation, and workmanship.

B. Provide a written warranty covering the work of this Division as required by the General Conditions.

C. Apparatus:

1. Free of defects of material and workmanship and in accord with the Contract Documents.

2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.

D. Include in Contractor's warranty for Work of Division 27, Communications system damage caused by failures of system component.

1.9 GENERAL

A. Meet or exceed applicable referenced standards, federal, state, and local requirements and conform to codes and ordinances of authorities having jurisdiction.

1.10 SUBMITTALS

A. General:

1. Guidelines set forth in this Section pertain to Division 27, Communications specifications included in this project.

2. Submit the following deliverables to the Owner and Design Team prior to ordering equipment or installation of equipment.

3. Partial submittals will not be considered, reviewed, or stored, and such submittals will not be returned.

4. Materials and equipment listed that are not in accordance with specification requirements and/or not prior approved may be rejected.

5. The approval of material, equipment, systems, and shop drawings is a general approval subject to the Drawings, Specifications, and verification of measurements at the job. Approval does not relieve the Contractor from the responsibility of shop drawing errors. Carefully check and correct shop drawings prior to submission for approval.

B. Informational Submittals:

1. Field Test Reports:

a. Submit sample cable test reports showing report format and parameters tested.

b. Submit minimum of 2 weeks prior to final punch walkthrough. Maintain test equipment on-site during punch for sample proof-of-performance tests.

2. Proposed test forms for fiber backbone, copper backbone, and horizontal UTP cable.

3. Certificates:

a. Certify that field tests have been performed and that work meets or exceeds specified requirements.

b. Certify that factory tests have been performed and that work meets or exceeds specified requirements. Certificates may be based on recent or previous test results, provided material or products tested are identical to those proposed for this Project.

c. Optical loss budget calculations for each optical fiber run.

d. Calibration report of test equipment for fiber and copper. Last calibration date should not be older than one year from the first day of testing.

e. Name(s) and copy of installer’s certificates as it pertains to the system design (e.g. RCDD, CTS, NICET, etc.).

C. Shop Drawings:

1. Original bid contract documents are not to be used as shop drawings. Generate their original shop drawings utilizing CAD software (i.e. AutoCAD, Revit, etc.)

2. Shop drawings that appear to be traces or overlays of original bid contract documents immediately rejected.

3. Where scope is distributed among multiple sub-contractors, each sub-contractor's submittal makes reference the other submittal where connections to equipment provided by other sub-contractors is required.

   a. Example: Contractor A provides System X shop drawings. Contractor B provides System Y shop drawings. Both sets of shop drawings must make references to each other where systems X or Y are interdependent on each other to function.

4. General Requirements:

   a. Clear and legible

   b. Utilize the same sheet size as the contract drawings.

   c. Use minimum of 1/8-inch text height for text, symbol text, and subscript text.

   d. Plan drawings utilize the same scale as issued in the contract documents.

   e. Plan drawings utilize the same sheet order as issued in the contract documents.

   f. Plan drawings utilize the same grid-line locations relative to the sheet as issued in the contract document (this is to aid overlay and checking of shop drawings vs. contract documents and to aid the as-built documentation).

   g. Sheets, including the cover sheet include a title block containing the following information:

      (1) System specific sheet number

      (2) Project name, specification section number, and Section title name

      (3) Floor name, area, and/or floor description matching that of the contract drawings.

   h. Include architectural information on the shop drawings including, but not limited to the following:

      (1) Match Lines

      (2) Grid Lines

      (3) Grid Bubbles

      (4) Key Plans

(5) Enlarged Floor Plan Callouts

5. Cover Sheet:

a. The first page of shop drawings includes a coversheet containing the following information:

(1) Site Information:

(a) Name of Site

(b) Address

(c) City

(d) Zip Code

(2) Installing Contractor's Information:

(a) Business Name

(b) Local Office Address

(c) Phone Number

(d) Website

(e) Primary Contact Person:

1) Name

2) Phone Number

3) Email Address

b. Provide sheet index on the coversheet.

6. Legends:

a. Symbols:

(1) Shop drawings include an associated symbol for each device used on the symbol legend, including but not limited to the following:

(a) Symbol Name

(b) Device Description

(c) Rough-in Requirements

(d) Applicable Manufacturer

(e) Manufacturer's Model Number

b. Wiring:

(1) Shop drawings include an associated symbol for each wire used on the symbol legend, including but not limited to the following:

(a) Cable Designator

(b) Cable Manufacturer

(c) Model Number

(d) Cable Rating (e.g. CMP, CMR, OSP, etc.)

(e) Size of Conductors

(f) Quantity of Conductors

(2) Each cable type has a different designation.

7. Plans and Elevations:

a. Plan Views:

(1) Devices, cabinets, racks, and termination blocks.

(2) Raceways (conduits, cable trays, ladder racks, floor ducts, junction boxes, pull boxes, splice boxes, manholes, and associated supports).

(3) Field devices with their respective address number.

(4) IP addresses for TCP/IP devices included in the system.

(5) Equipment clearances for racks/cabinets.

b. Elevation Views:

(1) Termination blocks, patch panels, wire managers, and other devices.

(2) Vertical and horizontal offsets and transitions.

(3) Vertical elevation of cable trays above the floor or bottom of ceiling structure.

(4) Clearances for access above and to side of cable trays.

(5) Rack Layouts

(a) Intended equipment layout within the racks.

(b) Blank filler plates in spaces where equipment is not installed.

(c) Areas within the rack for equipment furnished by or reserved by others.

(d) Indicate rack unit size of equipment, and total rack units available in the rack.

8. Details and Diagrams:

a. Details:

(1) Mounting details for head-end equipment, racks, and field devices.

b. Diagrams:

(1) Associated one-line or riser diagram showing connections between devices and connections to equipment provided in other systems.

(2) Indicate cable type, sizes, and quantities between each TR for backbone copper and fiber cabling.

(3) Show field devices with their respective room names/numbers and connections to their associated equipment.

(4) Show field devices with their respective address number.

(5) Show IP addresses for TCP/IP devices included in the system.

9. System Labeling Schedules:

a. Electronic copy of labeling schedules, in software and format selected by Owner.

10. Deferred Submittals:

a. Mounting Details:

(1) Provide engineering analysis, calculations, and drawing details of device restraints and supports for maximum loading in compliance with Code and coordinated with all trades.

(2) Details to show loads, connection type/materials, dimensions, etc., specific to each unique installation instance.

(3) Details to indicate both expected and maximum loads.

(4) Analysis to adhere to seismic bracing requirements in the jurisdiction specific to the project.

(5) Details to be stamped and signed by an Engineer licensed for the applicable work in the project's area of jurisdiction.

(6) Provide details for:

(a) Floor mounted equipment racks, including raised floor supports.

(b) Cable tray, runway, and wire-basket tray.

(c) Ceiling and Wall:

1) Supported flat panel displays.

2) Supported projectors and projection screens.

(d) Roof-mount devices, braced to withstand maximum wind gusts and uplift pressures.

(e) Conduit and junction boxes infrastructure systems.

(f) Antennas and satellite dishes.

(g) Other ceiling and wall supported devices weighing more than 20 pounds.

1.11 PRODUCT ASSURANCE

A. UL and/or ETL approved and labeled in accordance with NEC for products where labeling service normally applies.

B. Label materials and equipment requiring UL 94, 149, or 1863. Modification of products that nullifies UL labels is not permitted.

C. Materials and equipment provided by standard Commercial-Off-The-Shelf (COTS) products of a manufacture engaged in the manufacture of such products.

D. Typical commercial designs that comply with the requirements specified. Materials and equipment readily available through manufacturers and/or distributors. Supply equipment complete with optional items required for proper installation.

E. Materials or Manufactures not listed in this Division 27, Communications but are required materials to provide a complete and functioning cable infrastructure system have cut sheets and product data included in the material and procedures submittal package.

F. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance and backward compatibility.

G. Test fiber cable while on the reel prior to installation of the cable. Assume liability for replacement of cable should it be found defective at this time or a later date prior to customer acceptance.

1.12 COORDINATION

A. Coordinate arrangement, mounting, and support of communications equipment with Architect, Communication Design Professional or Owner Information Technology Team:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide the most efficient pathway for structured cabling endpoint devices such that the cabling never exceeds the 295-feet permanent link distance. Pathways must be shown on shop drawings for review prior to installation.

3. To provide for ease of disconnecting the equipment with minimum interference to other installations.

4. To allow right-of-way for piping and conduit installed at required slope.

a. Racks and Communication Cabinets: 3-foot minimum.

b. Open Pathways – Cable Tray, J-Hooks: 12-inch clear on working side; 3-inch clear from ceiling tiles.

c. Closed Pathways – Conduit (Above and Below Grade):

(1) 3-inch clear from electrical pathways concrete encased.

(2) 12-inch clear in electrical pathways in dirt.

(3) 48-inch clear electrical Motors and transformers.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08, Openings.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07, Thermal and Moisture Protection.

E. Responsible for coordination with all trades, to include required scheduling of materials and/or equipment with Owner and/or General Contractor for delivery, storage, and protection of equipment as required.

F. Finishes: Where specific device finishes have not been identified, selected by Owner or Architect, finish to match surrounding surfaces.

1.13 PRE-INSTALLATION CONFERENCE

A. Arrange and schedule pre-installation conference prior to beginning work of this Section Division 27, Communications.

B. Agenda: Clarify questions in writing related to work to be performed, scheduling, coordination, etc., with Consultant and/or Project Manager/Owner representative.

C. Individuals, who will be in an on-site supervisory capacity, are required to attend the pre-installation conference. This includes project managers, site supervisor, and lead installers. Individuals who do not attend the conference will not be permitted to supervise the personnel that install, terminate, or test communications cables on the project. Oversee the installation is required to attend the pre-installation conference.

D. The manufacturer that will be providing the extended warranty is required to have a representative attend the pre-installation conference.

1.14 FIELD QUALITY CONTROL

A. Perform the following field inspections during installation and commissioning:

1. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings.

2. Visually inspect cabling placements, pathways, and terminations in communications equipment rooms, telecommunications rooms, and work areas for compliance with standards and codes.

3. Visually inspect grounding and bonding for compliance with standards and codes.

4. Visually inspect installed cable trays, cable pathways, and wall penetrations for compliance with standards and codes.

B. Responsible for field inspections and will submit a signed weekly inspection report to Owner.

1.15 ALTERNATES, SUBSTITUTIONS, AND CHANGE ORDERS

A. If a proposed alternate material submitted as an “or approved equal” to or exceeds specified requirements, provide manufacturer’s specifications in writing for written approval prior to purchase and installation of proposed materials. The proposed material substitution not void or change manufacturer’s warranty.

B. Provide a complete cabling infrastructure according to these written specifications and drawings. Changes from the Owner changes the scope of work to be performed by the Contractor, put in writing. Respond to changes with a complete material list, labor, and taxes in writing presented to the Owner for approval. Do not proceed with additional scope of work without a signed approval by the Owner.

C. Additional work performed by the Contractor will not be paid by Owner without signed approval of these changes prior to implementing changes. Submit a copy of signed change order upon billing.

D. Refer to Technology Drawings for detailed information relating to the appropriate alternates.

1.16 PROJECT MANAGEMENT

A. Designate a project manager to act as the single point of contact. Project manager to oversee work performed to ensure a quality installation compliant with specifications as outlined in documents (which includes specifications and drawings). Owner or Consulting Engineer will review a copy of the resume of the on-site project managers and each on-site team.

B. Contractor project manager/supervisor to attend meetings arranged by General Contractor, Architect, Owner’s representatives, and/or other parties affected by work of this specification.

1.17 DELIVERY AND STORAGE

A. Assume custody and responsibility for the items upon delivery and determining that the contents are complete and in satisfactory condition for installation.

B. Delivery, loss, storage, and protection: Materials and equipment delivered and placed in storage stored with protection from the weather, humidity, and temperature variation, dirt, and dust or other contaminants.

C. Coordinate deliveries and submittals with the General Contractor/Owner to ensure a timely scheduled installation.

D. Responsible for handling and control of cabling equipment and liable for material loss due to delivery and storage problems.

E. No equipment or materials delivered to the job site more than three weeks prior to the commencement of its installation. Coordinate with General Contractor/Owner on location of storage materials.

1.18 AS-BUILTS

A. Record copy and as-built drawings.

1. Provide record copy drawings periodically throughout the project as requested by the General Contractor or Owner, and at end of the project on CD-ROM. Record copy drawings at the end of the project in AutoCAD format and include notations reflecting the as built conditions of additions to or variation from the drawings provided such as, but not limited to, cable paths and termination points. AutoCAD drawings are to incorporate test data imported from the test instruments.

2. As built drawings include, but are not limited to: block diagrams, frame and cable labeling, cable termination points, equipment room layouts, rack elevations, and frame installation details. The as-built drawings includes field changes made up to construction completion:

a. Field directed changes to cross connect and patching schedule.

b. Horizontal cable routing changes.

c. Backbone cable routing or location changes, inclusive outside plant physical pathways (if within scope of this project).

d. Associated detail drawings.

1.19 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, dust, and construction debris and repair damaged finish, including chips, scratches, and abrasions. This includes touching up paint removed for grounding.

B. Provide a clean work environment, free from trash/rubbish accumulated during and after cabling installation.

C. Maintain construction materials and refuse within the area of work. Clean the work area at the end of each day.

D. Keep liquids off finished floors, carpets, tiles, racks, and equipment. If liquid damages finishes or equipment, provide professional services to clean or repair scratched/soiled finishes or damaged equipment at the Contractors own expense.

1.20 PAINTING

A. Certain Division 27, Communications Sections contain the requirement of painting, it is the responsibility of the Contractor to coordinate the requirements and labor involved to complete this work with the General Contractor.

B. Touch up marred and bared surfaces of primed, galvanized, and finish painted equipment, materials, and accessories installed.

C. Restore patched surfaces as close to the original condition and finish as reasonably possible. Where patching occurs in smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received two coats of primer and two coats of finished paint.

PART 2 PRODUCTS

2.1 GENERAL

A. Where specified materials or methods conflict with applicable codes, the more stringent requirement applies.

B. Provide apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.

C. Materials and Equipment:

1. Use materials and equipment that are:

a. New

b. Of quality meeting or exceeding specified standards.

c. Free of faults and defects.

d. Conforming to Contract Documents.

e. Of size, make, type, and quality specified.

f. Suitable for the installation indicated.

g. Manufactured in accordance with NEMA, ANSI, UL, or other applicable standards.

h. Otherwise as specified in Division 01, General Requirements.

2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer.

    a. Component parts of the entire system need not be products of same manufacturer.

D. Basis of Design:

1. First listed manufacturer specified by performance or model number considered the Basis of Design.

2. If other equipment is provided in lieu of the Basis of Design equipment, assume responsibility for changes and costs which may be necessary to accommodate this equipment, including, but not limited to:

    a. Different sizes and locations for connections.

    b. Different dimensions.

    c. Different access requirements.

    d. Different configurations of connected equipment.

    e. Other differences.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:

1. Full and complete compliance with standards and guidelines set forth in this and subsequent specifications.

2. Field verify existing conditions prior to installation and make note of conflicts and discrepancies between these specifications and construction drawings to the Owner immediately.

    a. Field discrepancies not noted to the Owner or Design Team prior to installation commencement the responsibility of the Contractor and repaired at no cost to the Owner.

3. Provide a complete and properly operating system for each item of equipment specified.

4. Install materials in a neat and professional manner.

5. Comply with equipment manufacturer’s written instructions, the best industry practices, and the Contract Documents.

B. Clarification:

1. Where there is a conflict among manufacturer's instruction, best practice, and the Documents, request clarification from the Architect prior to rough-in.

2. Architect's decision will be final.

3. Remove and correct work installed without clarification by the Contractor at no cost to the Owner.

C. Existing concrete, block, or brick walls are considered not accessible and may require use of Surface Mounted Raceway (SMR) if existing concealed raceway and device boxes are not available for reuse or do not meet the intent of the design. Coordinate route and installation where SMR is required with the Architect/Engineer prior to rough-in. Responsible for reinstalling SMR routed without such prior approval to the Architect's satisfaction.

D. Existing stud walls (wood or metal) with or without blocking with plaster, plasterboard, or paneling finish are considered accessible with accessible ceiling, attic, tunnel, or crawl space above, below, or adjacent. Remove, patch, and repair finished surface as required to conceal rough-in for new device locations. If it is determined that a specific instance will not permit concealment of rough-in due to obstructions such as beams, headers, and other structural elements, prior approval before rough-in from the Architect is required.

3.2 INSTALLATION IN RATED CONSTRUCTION

A. Install intumescent material around ducts, conduits, and other telecommunications elements penetrating rated construction.

B. Comply with firestop materials manufacturer's written instructions to prevent spread of smoke or fire through sleeves or block-outs penetrating rated fire barriers.

C. Provide firestop materials specified in Division 07, Thermal and Moisture Protection, and as follows:

1. Capable of passing a 3-hour test per ASTM E-814 (UL 1479).

2. Consisting of material capable of expanding nominally eight times when exposed to temperatures of 250 degrees F – 350 degrees F.

3. An alternate method utilizing intumescent materials in caulk or putty complying with Division 07, Thermal and Moisture Protection may be used.

3.3 EQUIPMENT SUPPORT

A. Minimum Support Capacity:

1. Provide fastening devices and supports for equipment, panels, outlets, and cabinets capable of supporting not less than four times the ultimate weight of the object or objects fastened to or suspended from the building structure.

B. Support junction boxes, pull boxes, or other conduit terminating housings located above the suspended ceiling from the floor above, roof, or penthouse floor structure to prevent sagging or swaying.

C. Conduits:

1. Support suspended conduits 1-inch and larger from the overhead structural system with metal ring or trapeze hangers and threaded steel rod having a safety factor of four.

2. Conduits smaller than one 1-inch installed in ceiling cavities may be supported on the mechanical system supports when available space and support capacity has been coordinated with the sub-contractor installing the supports.

3. Anchor conduit installed in poured concrete to the steel reinforcing with 14 AWG black iron wire.

D. Powder actuated or similar shot-in fastening devices will not be permitted for technology work except by review from the project structural engineer.

3.4 ALIGNMENT

A. Install panels, cabinets, and equipment level and plumb, parallel with structural building lines.

B. Install equipment and enclosures fitted neatly, without gaps, openings, or distortion.

C. Properly and neatly close unused openings with approved devices.

D. Fit surface panels, devices, and outlets with neat, appropriate, trims, plates, or covers without overhanging edges, protruding corners, or raw edges.

3.5 CUTTING AND PATCHING

A. General:

1. Comply with Division 01, General Requirements.

2. Restore to original condition new or existing work cut or damaged by installation, testing, and removal of work.

3. Patch and finish spaces around conduits passing through floors and walls to match the adjacent construction, including painting or other finishes.

4. Clean up and remove dirt and debris.

B. Make additional required openings by drilling or cutting. Use of jackhammer is prohibited.

C. Fill holes that are cut oversize so that a tight fit is obtained around the objects passing through.

1. In rated construction, comply with Division 07, Thermal and Moisture Protection.

D. Obtain Architect’s permission and direction prior to piercing beams or columns.

E. Where alterations disturb lawns, paving, walks, and other permanent site improvements, repair and refinish surfaces to condition existing prior to commencement of work.

3.6 PROTECTION OF WORK

A. Protect telecommunication work and equipment installed under this Division against damage by other trades, weather conditions, or other causes.

1. Equipment found damaged or in other than new condition will be rejected as defective.

B. Keep equipment, panels, outlets, and related telecommunication equipment covered or closed to exclude dust, dirt, and splashes of plaster, cement, paint, or other construction material spray.

1. Equipment not free of contamination is not acceptable.

C. Provide enclosures and trims in new condition, free of rust, scratches, and other finish defects.

1. If damaged, properly refinish in a manner acceptable to the Architect.

3.7 COMPLETION AND TESTING

A. General:

1. Comply with Division 01, General Requirements.

B. Upon completion, test systems to show that installed equipment operates as designed and specified, free of faults.

1. Schedule system tests so that several occur on the same day.

2. Coordinate testing schedule with construction phasing.

3. Submit systems test reports for Design Team review and feedback.

4. Schedule proof-of-performance testing with Design Team representative and/or Owner’s representative.

C. A qualified contractor with required tools to conduct cable and equipment tests. Arrange to have the equipment factory representative present for those tests where the manufacturer’s warranty could be impacted by the absence of a factory representative.

D. Perform tests per the requirements of each of the following systems:

1. Horizontal data/voice structured cabling system.

2. Backbone data/voice cabling system.

3. Audio/video systems.

E. Software and Programming

1. Software, firmware, web-based GUI, and other systems with username and login credentials given unique passwords from the factory defaults.

2. Maintaining factory default credentials is not acceptable.

3. Document username/passwords for equipment in the as-built/O&M manuals.

END OF SECTION

PATHWAYS FOR COMMUNCATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Conduit and other Closed Pathway System
2. Pathway Bend Management
3. Wide Base Cable Supports
4. Cable Trays - General
5. Cable Tray – Robust with Side Rails
6. Cable Runways (Ladder Type) Cable Tray
7. Wire Basket Cable Tray
8. Cable Tray Accessories
9. Device Backboxes
10. Enclosures and Pullboxes
11. Floor Boxes
12. Flat Panel Display Wall boxes
13. Fire Rated Pathways
14. Acoustically Separated Pathways
15. Cable Straps

B. Handholes and Boxes for Exterior Underground Cabling

C. Work covered by this Section consists of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified for a complete pathways system for the communications systems.

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 27, Communications

C. Section 26 05 33, Raceways and Boxes for Electrical Systems

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

E. Provisions of Division 27, Communications Section 27 05 00, Common Work Results for Communications, apply to this Section.

1.3 REFERENCES

A. References, Codes and Standards as required by Section 27 05 00, Common Work Results for Communications and Division 01, General Requirements.

B. In addition, meet the following:

1. Underwriters Laboratories, Inc.:

a.	UL 1-03	Flexible Metal Conduit
b.	UL 5-01	Surface Metal Raceway and Fittings
c.	UL 6-03	Rigid Metal Conduit
d.	UL 50-03	Enclosures for Electrical Equipment
e.	UL 360-03	Liquid-Tight Flexible Steel Conduit
f.	UL 467-01	Grounding and Bonding Equipment
g.	UL 514A-01	Metallic Outlet Boxes
h.	UL 514B-02	Fittings for Cable and Conduit
i.	UL 514C-05 Covers	Nonmetallic Outlet Boxes, Flush-Device Boxes and
j.	UL 651-02	Schedule 40 and 80 Rigid PVC Conduit
k.	UL 651A-03	Type EB and A Rigid PVC Conduit and HDPE Conduit
l.	UL 797-03	Electrical Metallic Tubing
m.	UL 1242-00	Intermediate Metal Conduit
n.	UL 1684	Fiberglass Conduit Above Ground

2. National Electrical Manufacturers Association:

a.	NEMA TC-3-04 Tubing	PVC Fittings for Use with Rigid PVC Conduit and
b.	NEMA FB1-03 Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable	

1.4 QUALITY ASSURANCE

A. Conform to the quality assurance requirements of Section 27 05 00, Common Work Results for Communications and Division 01, General Requirements.3

B. Low voltage system cable supports and accessories listed to Underwriter's Laboratories or other national recognized testing laboratory.

C. Low voltage system cable supports and accessories have the manufacturers name and part number stamped on the part for identification.

D. Pre-Installation Meetings:

1. Setup a pre-installation meeting to discuss low voltage cable support layout work and installation guidelines.

2. Organize meeting a minimum of 30 days prior to initiating cable support installation work.

3. Attendees include Contractor, appropriate subcontractors, low voltage system vendors, Architect, and Owner's Representative.

E. Purpose of meeting is to coordinate work between the parties to have a consistent layout for low voltage system cables, minimize interferences, and to make cable system accessibility for future owner modifications and maintenance high priority issue for installers.

1.5 SUBMITTALS

A. Including, but not limited to: Product Data Sheets, Shop Drawings, etc.

B. General:

1. Submit in accordance with Section 27 05 00, Common Work Results for Communications submittal requirements.

C. Closeout Submittals:

1. Submit in accordance with Section 27 05 00, Common Work Results for Communications submittal requirements.

D. Additional requirements specific to this Section:

1. Firestop design basis documentation that includes each type of communication penetration, type of building construction being penetrated including the hourly resistance rating of floor, wall, or other partition of building construction into which firestop design will be installed, and firestop device or system proposed for use.

1.6 COORDINATION

A. Responsible for coordinating the arrangement, mounting and support for communications support equipment.

B. In accordance with the requirements set forth in Section 27 05 00, Common Work Results for Communications, provide the following:

1. Plan view and elevations of raceways (conduits, cable trays, ladder racks, floor ducts, junction boxes, pull boxes, splice boxes, manholes, and associated supports).

a. Vertical and horizontal offsets and transitions.

b. Clearances for access above and to side of cable trays.

c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.

C. Coordinate layout and installation of low voltage cable bundle supports with other construction elements to ensure adequate headroom, working clearance and access. Revise locations and elevations for those indicated as required to suit field conditions and as approved by Owner's Representative.

D. Examine drawings and existing conditions above ceilings and include additional supports in bid price to avoid ducts, pipes, conduits, etc. Installation in existing ceilings can be very difficult. Include extra labor time involved in bid price.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Conduit and Other Closed Pathways Systems:

1. Conduit:

a. Allied

b. Prime

c. Wheatland

d. Or approved equal.

2. Conduit Supports:

a. Allied

b. Prime

c. Wheatland

d. Or approved equal.

B. Pathway Bend Management:

1. Panduit Conduit Waterfall

2. Bejed Cable Spillway

3. STI Radius Control Modules
4. Legrand
5. Or approved equal.

C. Wide Base Cable Supports:

1. ERICO Caddy CableCat Series
2. Garvin
3. ICC
4. Or approved equal.

D. Cable Tray, Robust with Side Rails:

1. Cooper B-Line
2. PW Industries
3. Or approved equal.

E. Cable Runways (Ladder-Type) Cable Trays:

1. Chatsworth Products (CPI).
2. B-Line Cooper, Inc.
3. Hoffman.
4. Cablofil/Legrand.
5. Or approved equal.

F. Wire Basket Cable Tray:

1. Cablofil/Legrand
2. Chatsworth Products (CPI)
3. B-Line Cooper, Inc.
4. Hoffman
5. WBT
6. Or approved equal.

G. Cable Tray Accessories:

1. Compatible w/ submitted tray manufacturer.

H. Device Backboxes:

1. Raco
2. Steel City
3. Bowers
4. Or approved equal.

I. Enclosures and Pullboxes:

a. Hoffman
b. Cooper B-Line
c. Or approved equal.

J. Floor Boxes:

1. Floor Box Type FB1:

a. Wiremold CRFB4 with Evolution Series Poke Thru Cover and device plate inserts as required to meet specified configurations.
b. FSR
c. Hubbell
d. Or approved equal.

2. Floor Box Type FB2:

a. Wiremold EFB8S with Flush Style Cover with Carpet Insert and device plate inserts as required to meet specified configurations.
b. FSR
c. Hubbell
d. Or approved equal.

K. Flat Panel Display Wall Boxes:

1. Wall Box Type WB1:

a. Basis of Design: FSR PWB-200 series with device plate inserts as required to meet specified configurations.
b. Wiremold
c. Peerless

d. Or approved equal.

2. Wall Box Type WB2:

a. Basis of Design: FSR PWB-200 series with device plate inserts as required to meet specified configurations.

b. Wiremold

c. Peerless

d. Or approved equal.

L. Fire Rated Pathways:

1. STI EZ-path

2. Hilti Speed Sleeve

3. 3M

4. Or approved equal.

M. Acoustically Separated Pathways:

1. STI Acoustical Pathway

2. Hilti Acoustic and Smoke Pathway

3. Or approved equal.

N. Cable Straps:

1. Panduit

2. Velcro

3. Or approved equal.

2.2 CONDUIT AND OTHER CLOSED PATHWAY SYSTEMS

A. Conduit Size: In accordance with the NEC, but not less than 1-inch unless otherwise shown in the Contract Drawings.

B. Install in accordance with the construction documents, national codes, and applicable publications designated herein.

C. Conduit:

1. Following construction types:

2. Fiberglass

3. Electrical Metallic Tubing

4. Rigid Galvanized Steel

5. Flexible Non-Metallic Conduit.

6. Install as recommended by the raceway manufacturer and construction documents.

7. Flexible Metallic Conduit is not permitted in this project for interior installation.

D. Conduit Supports:

1. Individual Conduit Hangers: Designed for the purpose, having a preassembled closure bolt and nut, and provisions for receiving a hanger rod.

2. Install conduit supports at a maximum of 5-foot centers.

2.3 PATHWAY BEND MANAGEMENT

A. Device to control the bend radius must comply with National Electrical Code requirements and TIA Standards. In addition, the product must be RoHS compliant to meet environmental requirements, UL 94V-0 approved to reduce the spread of flame, and be approved by UL for use in air handling spaces.

B. UL Listed:

C. Provide at horizontal 4-inch conduits.

D. Provide at cable tray above equipment racks.

2.4 WIDE BASE CABLE SUPPORTS

A. Wide base J-hooks complying with most current revision of the TIA 568 and 569 structured cabling system requirements.

B. Minimum size is 1-5/16-inch diameter loop for 50, 4-pair UTP or 2 strand fiber optic cable or inner duct. Provide larger size or multiple hooks where required.

C. Minimum 1-inch width and flared edges where cables enter and leave support.

1. 1.3-inch diameter loop for maximum 35, 4-pair UTP

2. 2-inch diameter loop for maximum 50, 4-pair UTP

D. Accessories:

1. Provide applicable accessories to independently support J-hooks from structure.

2. Include extender bracket for mounting multiple J-hooks on a single support, fasteners, and clamps for connecting to wall, beams, rods, dedicated support wires and C and Z Purlins as required for specific construction.

E. Cable Retainers: Provide cable retainers at each J-hook.

F. Refer to cable bundling instructions specified herein.

G. Finish:

1. Dry Locations, Above Lay-in Ceiling, Below Raised Floor – galvanized.

2. Wet and Damp Locations: stainless steel.

2.5 CABLE TRAYS – GENERAL

A. Application, unless otherwise noted:

1. Robust with Side Rails: Located overhead within Telecommunications Rooms.

2. Wire-Basket Tray: Located between Telecommunications Rooms and work area outlets.

3. Ladder-Type Cable Runway: Vertical transitions within Telecommunications Rooms.

B. Cable Tray Radius Drops: Provide wherever cable is to drop from one section of cable tray to another lower section of cable tray, or is to drop from cable tray to equipment racks/frames.

C. Cable Tray Grounding Kits: Provide across cable tray splices.

D. Cable Trays and Accessories:

1. Identified as defined in NFPA 70 and marked for intended location, application, and grounding.

2. Source Limitations:

a. Obtain cable trays and components from single manufacturer.

E. Sizes and Configurations: Refer to the Drawings for specific requirements for types, materials, sizes, and configurations.

F. Structural Performance:

1. Refer to articles for individual cable tray types for specific values for the following parameters:

a. Uniform Load Distribution:

(1) Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.

b. Concentrated Load: A load applied at midpoint of span and centerline of tray.

c. Load and Safety Factors: Applicable to both side rails and rung capacities.

d. Seismic Performance:

(1) Cable trays and supports able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.

(2) Cable trays will remain in place without separation of parts when subjected to the seismic forces specified.

(3) Component Importance Factor: 1.0.

2.6 CABLE TRAY, ROBUST WITH SIDE RAILS

A. Steel or aluminum construction.

B. Rung Spacing: 9-inches on center.

C. No portion of the rungs protrude below the bottom plane of side rails.

D. Straight Section Lengths: 10-feet except where shorter lengths are required to facilitate tray assembly.

E. Width and Height: As indicated on Drawings.

F. Splicing Assemblies: Bolted type using serrated flange locknuts.

G. Splice Plate Capacity: Splices located within support span not to diminish rated loading capacity of cable tray.

H. Color: Black, U.O.N.

2.7 CABLE RUNWAYS (LADDER-TYPE) CABLE TRAYS

A. Ladder rack manufactured from tubular steel. Stringers (sides) will be made from 3/8-inch wide by 1-1/2-inch high tubular steel with 0.065-inch wall thickness. Cross members (rungs) will be made from 1-inch wide by 1/2-inch high tubular steel with 0.065-inch wall thickness.

B. Rung Spacing: 9-inches on center.

C. No portion of the rungs protrude below the bottom plane of side rails.

D. Straight Section Lengths: 10-feet except where shorter lengths are required to facilitate tray assembly.

E. Width: As indicated on Drawings.

F. Splicing Assemblies: Bolted type using serrated flange locknuts.

G. Splice Plate Capacity: Splices located within support span not to diminish rated loading capacity of cable tray.

H. Color: Black, U.O.N

2.8 WIRE BASKET CABLE TRAY

A. Configuration:

1. Wires are formed into a standard 2-inch by 4-inch wire mesh pattern with intersecting wires welded together.

2. Mesh sections must have at least one bottom longitudinal wire along entire length of section.

B. Materials: High-strength-steel longitudinal wires with no bends.

C. Safety Provisions: Wire ends along wire-basket sides (flanges) rounded during manufacturing to maintain integrity of cables and installer safety.

D. UL Classified as an equipment ground conductor.

E. Sizes:

1. Furnish straight sections in standard 10-foot lengths.

2. Wire-Basket Depth: As shown in Drawings.

F. Maximum Loads: 50 pounds per foot (74 kg/m).

G. Connector Assemblies:

1. Bolt welded to plate shaped to fit around adjoining tray wires and mating plate.

2. Mechanically joins adjacent tray wires to splice sections together or to create horizontal fittings.

H. Connector Assembly Capacity: Splices located within support span not to diminish rated loading capacity of cable tray.

I. Hardware and Fasteners: Zinc-plated according to ASTM B 633.

2.9 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Barrier Strips: Same materials and finishes as for cable tray.

C. Cable tray supports and connectors, including bonding jumpers, 90 bends, and radius drop-outs as recommended by cable tray manufacturer.

2.10 DEVICE BACKBOXES

A. Flush mounted, sheet steel construction with conduit knockout.

B. UL514A Listed

C. Unless otherwise noted, provide:

1. 4-11/16-inch square, 2-1/8-inch deep backbox standard for Communications and Audio-Video devices.

2. 4-inch square, 2-1/8-inch deep backbox standard for Electronic Security devices.

3. Code minimum rated for the installed application.

D. Gang mud rings sizes as required for the applicable device.

2.11 ENCLOSURES AND PULLBOXES

A. Pull Boxes:

1. Provide enclosure and pull boxes as shown in the construction documents.

2. Measure and provide additional conduit offsets required by Contractor not shown in Drawings with properly sized pull boxes.

3. Pull Box Sizing:

Minimum Trade Size Conduit	Width	Length	Depth	Each Additional Conduit Increase (Width)
3/4-inch	4-inch	12-inch	3-inch	2-inch
1-inch	4-inch	16-inch	3-inch	2-inch
1-1/4-inch	6-inch	20-inch	3-inch	3-inch
1-1/2-inch	8-inch	27-inch	4-inch	4-inch
2-inch	8-inch	36-inch	4-inch	5-inch
2-1/2-inch	10-inch	42-inch	5-inch	6-inch
3-inch	12-inch	48-inch	5-inch	8-inch
3-1/2-inch	12-inch	54-inch	6-inch	6-inch
4-inch	15-inch	60-inch	8-inch	8-inch

2.12 FLOOR BOXES

A. Floor Box Type FB1:

1. Floor box system must be reconfigurable after installed inside the floor.

2. Combination floor box to accommodate multi-trade services.

3. Multiple standard gang compartments separated by voltage barriers that can accommodate standard faceplate mounting brackets.

4. Device faceplates recessed below floor, not flush with floor.

5. Minimum knockouts: 3/4-inch, 1-inch, and 1-1/4-inch.

6. Full access cover with hinged flip-lid for cable pass-through. Finish and flange depth per Architect; floor boxes to be completely flush in closed position. Confirm final cover selection with Architect.

7. Nominal depth: 3-1/2-inches.

8. Suitable for installation within floor types as shown in the Drawings.

9. UL listed to match fire-rating of floor.

10. Gang/service configuration:

2.13 FIRE RATED PATHWAYS

A. Self-closing through wall penetrations for cabling pathway, without the use of sealant, putty, foam pads, or other similar sealing means.

B. Meets hourly rating for the partition penetrated.

C. Accommodates frequent cable moves, adds, and changes.

D. Permits the allowable cable load to range from 0 to 100 percent visual fill.

E. Does not require additional action on the part of the installer to open or close the pathway device, such as, but not limited to:

1. Opening or closing of doors.

2. Twisting an inner liner.

F. Minimum STC rating empty or full: 45

2.14 ACOUSTICALLY SEPARATED PATHWAYS

A. Self-closing through wall penetrations for cabling pathway, without the use of sealant, putty, foam pads, or other similar sealing means.

B. Accommodates frequent cable moves, adds, and changes.

C. Permits the allowable cable load to range from 0 to 100 percent visual fill.

D. Does not require additional action on the part of the installer to open or close the pathway device, such as, but not limited to:

1. Opening or closing of doors.

2. Twisting an inner liner.

E. Minimum STC rating empty or full: 45

2.15 CABLE STRAPS

A. Use within telecommunications rooms and open cable pathways (cable tray). Provide for strapping groups of cables to raceway and for controlling/managing patch cables.

B. The use of plastic tie wraps for this purpose is not acceptable.

1. Self-gripping, reusable, constructed of Velcro, and hook-and-loop style.

2. Plenum rated cable straps to be used in plenum air handling spaces.

C. Quantity:

1. Provide in sufficient quantity to strap cable bundles at intervals specific to the type of cable bundle. For the purposes of determining the quantity of straps to provide, the number of cables in a cable bundle and the intervals at which straps applied are as follows:

a. Bundle size (use to determine strap quantity):

(1) For Patch Cables: Maximum of 25 patch cables per cable bundle with straps applied at 1-foot intervals.

(2) For horizontal cabling: Maximum of 25 station cables per cable bundle with straps applied at 3-foot intervals.

(3) For Backbone Cables: Maximum of 4 backbone cables per cable bundle with straps applied at 3-foot intervals.

D. Bundling (use to determine strap quantity):

1. Bundle cables by application (patch, horizontal, backbone) and by cable type (Category X, MM Fiber, SM Fiber, etc.).

2. Do not intermix cable applications and types within a bundle.

E. Color: Black

PART 3 EXECUTION

3.1 CONDUIT INSTALLATION

A. Penetrations: Cutting or Holes:

1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the structural engineer prior to drilling through structural sections.

2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Owner’s Information Technology as required by limited working space.

B. Fire Stop:

1. Where conduits, wire ways, and other communications raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke, and gases as specified in Division 07, Thermal and Moisture Protection , with rock wool fiber or silicone foam sealant only.

2. Completely fill and seal clearances between raceways and openings with the fire stop material.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Division 07, Thermal and Moisture Protection.

3.2 INSTALLATION, GENERAL

A. Install conduit as follows:

1. In complete runs before pulling in cables or wires.

2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.

3. Assure conduit installation does not encroach into the ceiling height headroom, walkways, or doorways.

4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.

5. Mechanically continuous.

6. Independently support conduit at 5-feet on center. No other supports allowed.

7. Support within 1-foot of changes of direction, and within 1-foot of each enclosure to which connected.

8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.

9. Conduit installations under fume and vent hoods are prohibited.

10. Secure conduits to cabinets, junction boxes, pull boxes, and outlet boxes with bonding type locknuts. Do not use aluminum conduits in wet locations.

11. Unless otherwise indicated on the drawings or specified herein, install conduits concealed within finished walls, floors, and ceilings.

B. Conduit Bends:

1. Make bends only with manufacturer approved tools or fittings.

2. Do not use standard conduit bending machines.

3. Conduit hickey benders may be used for slight offsets, and for straightening stubbed out conduits.

4. Bending of conduits with a pipe tee or vise is prohibited.

C. Layout and Homeruns:

1. Deviations: Make only where necessary to avoid interferences and only after Drawings showing the proposed deviations have been submitted approved by the Owner Information Technology Team.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:

1. Conduit: Rigid steel, IMC or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.

2. Align and run conduit in direct lines.

3. Install conduit through concrete beams only when the following occurs:

a. Where shown on the Structural Drawings.

b. As approved by the Designer prior to construction, and after submittal of Drawing showing location, size, and position of each penetration.

4. Installation of conduit in concrete that is less than 3-inches thick is prohibited.

a. Conduit outside diameter larger than 1/4 of the slab thickness is prohibited.

b. Space between conduits in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.

c. Install conduits approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the conduits.

5. Conduit for conductors 600V and below:

a. Different type conduits mixed indiscriminately in the same system is prohibited.

6. Align and run conduit parallel or perpendicular to the building lines.

7. Connect recessed lighting fixtures to conduit runs with maximum 6 feet) of flexible metal conduit extending from a junction box to the fixture.

8. Tightening set screws with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

A. Unless otherwise indicated on the Drawings, exposed conduit is only permitted in mechanical and electrical rooms.

B. Conduit for Conductors 600V and below: Different type of conduits mixed indiscriminately in the system is prohibited.

C. Align and run conduit parallel or perpendicular to the building lines.

D. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

E. Support horizontal or vertical runs at not over 8-foot) intervals.

F. Surface Metal Raceways:

1. Use only where shown.

G. Painting:

1. Paint exposed conduit as specified in Division 09, Finishes.

2. Paint conduits containing cables rated over 600V safety orange.

3. Refer to Division 09, Finishes for preparation, paint type, and exact color.

4. Paint legends, using 2-inch high black numerals and letters, showing the cable voltage rating.

5. Provide legends where conduits pass through walls and floors and at maximum 20-foot intervals in between.

3.5 EXPANSION JOINTS

A. Conduits 3-inches and larger secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

B. Provide conduits smaller than 3-inches with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible non-metallic conduit to produce 5-inch vertical drop midway between the ends.

C. Install expansion and deflection couplings where shown.

D. Seismic Areas:

1. In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint.

2. Connect conduits to junction boxes with 15-inches of slack flexible conduit.

3. Flexible Conduit: Copper green ground bonding jumper installed.

3.6 CONDUIT SUPPORTS, INSTALLATION

A. Safe working load not to exceed 1/4 of proof test load of fastening devices.

B. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is 8-foot on center.

C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 pounds. Attach each conduit with U-bolts or other approved fasteners.

D. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

E. Fasteners and Supports in Solid Masonry and Concrete:

1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.

2. Existing Construction:

a. Steel expansion anchors not less than 1/4-inch bolt size and not less than 1-1/8-inch embedment.

b. Power set fasteners not less than 1/4-inch diameter with depth of penetration not less than 3-inches.

c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.

F. Hollow Masonry:

1. Toggle bolts are permitted.

G. Bolts supported only by plaster or gypsum wallboard are not acceptable.

H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

I. Attachment by wood plugs, raw plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

J. Do not use chain, wire, or perforated strap to support or fasten conduit.

K. Spring steel type supports or fasteners are prohibited for uses except: horizontal and vertical supports/fasteners within walls.

L. Vertical Supports:

1. Vertical Conduit:

a. Riser clamps and supports in accordance with the NEC and as shown.

2. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.7 BOX INSTALLATION

A. Boxes for Concealed Conduits:

1. Flush mounted.

2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.

B. Install additional boxes where needed to prevent damage to cables and wires during pulling in operations.

C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

3.8 COMMUNICATION SYSTEM CONDUIT

A. Minimum conduit size of 1-inch, but not less than the size shown on the Drawings.

B. Equip conduit ends with insulated bushings.

C. 4-inch conduits within buildings include pull boxes after every two 90 degree bends. Size boxes per the NEC.

D. Vertical conduits/sleeves through closets floors terminate not less than 3-inches below the floor and not less than 12-inches) below the ceiling of the floor below.

E. Terminate conduit runs to/from a backboard in a closet or interstitial space at the top or bottom of the backboard. Conduits enter communication closets next to the wall and be flush with the backboard.

F. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections such as ribs or beams.

G. Seal empty conduits located in communication closets or on backboards with a standard non-hardening duct seal compound to prevent the entrance of moisture and gases and to meet fire resistance requirements.

1. Conduit runs contain no more than 2 quarter turns (90 degree bends) between pull boxes/backboards. Minimum radius of communication conduit bends as follows (special long radius):

Sizes of Conduit Trade Size	Radius of Conduit Bends
3/4	6-inches
1	6-inch
1-1/4	7-1/5-inch
1-1/2	9-inch
2	12-inch
2-1/2	25-inch
3	30-inch
3-1/2	36-inch
4	40-inch

3.9 CABLE TRAY INSTALLATION

A. Install cable trays according to NEMA VE 2-2000 and manufacturer recommendations.

B. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

C. Install cable trays so that the tray is accessible from an 8-foot ladder for cable installation and splices are accessible for inspection and adjustment.

D. Remove burrs and sharp edges from cable trays. Provide nylon bushings at exposed cut edges.

E. Fasten cable tray supports to building structure and install seismic restraints.

F. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 pounds. Comply with requirements in Division 26, Electrical.

G. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.

H. Support bus assembly to prevent twisting from eccentric loading.

I. Install center-hung supports for single-rail trays designed for 60 vs. 40 percent eccentric loading condition, with a safety factor of 3.

J. Locate and install supports according to NEMA VE 2. Do not install more than one cable tray splice between supports.

K. Make changes in direction and elevation using manufacturer's recommended fittings.

L. Make cable tray connections using manufacturer's recommended fittings.

M. Seal penetrations through fire and smoke barriers. Comply with requirements in Division 07, Thermal and Moisture Protection.

N. Install cable trays with enough workspace to permit access for installing cables. Install tray so it is accessible from an 8-foot ladder.

O. Install warning signs in visible locations on or near cable trays after cable tray installation.

P. Provide Radius Tray drop-out at drop locations that exceed a 6-inch drop.

Q. Provide Cable Tray Sleeves where the cable tray penetrates a wall.

3.10 CABLE TRAY GROUNDING

A. Ground cable trays per Section 27 05 26, Grounding and Bonding for Communications Systems.

B. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Division 26, Electrical.

C. Bond cable trays with communications cable together with splice plates listed for grounding purposes or with listed bonding jumpers.

D. Bond cable trays with control conductors together with splice plates listed for grounding purposes or with listed bonding jumpers.

E. Ground cable trays following the NFPA 70 table 392.7(B) for conductor sizes. Field modified cable trays conform to the minimum Metal Area Requirements as specified in Table 392.7(B) of NFPA 70.

F. Bond cable trays to power source for cables contained within with bonding conductors sized according to NFPA 70, Article 250.122, Size of Equipment Grounding Conductors.

3.11 CABLE INSTALLATION

A. Install cables only when each cable tray run has been completed and inspected.

B. Fasten cables on vertical runs to cable trays every 18 inches, using specified Velcro cable straps. Plastic wire-ties are not permitted for communications use.

C. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure no more than 72-inches.

D. Pathway cabling fill to not exceed a maximum of 40 percent, or per manufacturer's recommendations. Provide multiple support and pathway systems where required cable count exceeds 40 percent fill.

E. Unless otherwise noted, group cabling in separate supports and pathways by the following systems:

1. Voice and Data, Intercom and IP Video Surveillance Systems
2. Analog Video Surveillance and SMATV/CATV Systems
3. Access Control and Intrusion Systems
4. Audio-Visual Systems
5. Distributed Antenna Systems
6. Building Automation Systems
7. Lighting Control Systems
8. Motorized Shade Systems
9. Fire Alarm Systems

3.12 CONNECTIONS

A. Connect pathways to cable trays according to requirements in NEMA VE 2-2000 and NEMA FG 1-1993 where applicable.

3.13 FIELD QUALITY CONTROL

A. Perform the following tests and inspections, with the assistance of a factory-authorized service representative if necessary:

1. After installing cable trays and after cabling has been energized, survey for compliance with requirements.

2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.

3. Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by physical barriers or are installed in separate cable trays. Barriers are required between different voltage types.

4. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.

5. Remove dust deposits, industrial process materials, trash of description, and blockage of tray ventilation.

6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and re-torque in suspect areas.

7. Check for improperly sized or installed bonding jumpers.

8. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.

9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 Ohm.

B. Provide test and inspection reports.

3.14 PROTECTION

A. Protect installed cable trays and cables.

1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction.

2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.

3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION

FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Central Station Reporting
2. Strobe Synchronization
3. Software
4. Remote Equipment
5. Detection Devices
6. Annunciation Devices
7. Electromagnetic Door Holders
8. Addressable Accessories
9. Controlled Devices
10. Cable

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 28, Electronic Safety and Security

C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables

D. Section 26 05 33, Raceways and Boxes for Electrical Systems

E. Section 26 05 53, Identification for Electrical Systems

1.3 SUBMITTALS

A. Shop drawings produced in AutoCAD with Fire Marshal's stamp of approval.

B. Product data with wiring schematics.

C. AutoCAD wiring diagrams of each type of device.

D. AutoCAD riser diagram of the complete systems/

E. Battery and voltage drop calculations based on intended routing and wiring.

F. Prepare shop drawings of the system by the manufacturer in AutoCAD and submitted to the Fire Marshal for approval. The approved shop drawings will be utilized as the installation drawings. The shop drawings show actual conduit routing and conductors as to be installed. Update drawings to include revisions and changes to the system during construction and installation.

1.4 QUALITY ASSURANCE

A. Approve and install equipment in accordance with NFPA, ADA and IBC requirements and UL listed both in individual components and as a system. ISO-9000 certified; UL and FM listed and meet NFPA 72.

B. Furnish evidence that there is an experienced and efficient service organization which carries a stock of repair parts for the system to be furnished and that the organization is capable of providing repair service within 24 hours of a trouble call.

C. Install system by an electrical contractor experienced in the installation of addressable fire alarm systems and certified by the national institute for certification in engineering technologies (NICET) for fire alarm systems. Control equipment factory representative services be obtained to provide engineered system floor plans and point-to-point drawings on AutoCAD. Representative to supervise the installation, system start-up, programming, make final adjustments and provide testing of the completed system. The factory representative provides a letter of system certification to the Architect.

1.5 CONTRACTOR DESIGN

A. Equipment shown on the contract drawings indicate the general nature of the fire alarm system, but does not necessarily show components required. Provide a complete fire alarm and communications system as needed to meet applicable codes and requirements under this section.

B. Review various sets of drawings for initiating and notification devices, and add devices if needed to comply with the requirements of NFPA 72.

C. Raceway, routing, and wiring for field devices are not shown on the drawings except for a few specific design requirements.

1.6 CONNECTION TO EXISTING NETWORK

A. General: Communication between peer-to-peer fire alarm control panels via TCP/IP over existing Ethernet, RS-485, RS-232 or other previously established panel system communication protocol.

B. Provide hardware, software and system integration to seamlessly integrate to the existing server for common system graphics, alarming, paging out of alarms via existing system.

C. Provide upgrade to existing control monitoring to accept new alarm points.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Match Existing System

B.

2.2 GENERAL

A. Furnish labor, materials, and equipment required for a complete and operating system of manual and automatic initiating devices, control panels, auxiliary relays, power supplies with batteries and accessories necessary to accomplish the desired sequence of events.

B. Fully electronic and addressable systems as described below with monitoring and annunciation of system alarms and troubles.

2.3 CONTROL PANEL

1. FACP is Existing and shall be expanded upon for this project.

2.4 CENTRAL STATION REPORTING

A. Provide universal digital alarm communicator transmitter (UDACT) integral to fire alarm control panel enclosure or in stand-alone enclosure as required. Contractor to confirm that FACP has a UDACT.

2.5 STROBE SYNCHRONIZATION

A. Synchronize strobes to 1Hz flash to comply with the Americans with Disabilities Act (ADA).

2.6 SOFTWARE

A. Field Configuration Program:

1. Provide programmable operating instructions for the system resident program stored on a non-volatile EEPROM.

B. Programming:

1. Perform at the location of the fire alarm control using a laptop computer system; hard copy of the system configuration is to be updated and maintained at the site.

C. Control-By-Event:

1. Program each address for selective alarm output, zone verification operation, control point activation on alarm or trouble and transmit alarm to the fire department.

2. Programmed control point activation to provide selective control.

2.7 REMOTE EQUIPMENT

A. Annunciator Control Panels: Alphanumeric display module:

1. 80 character LED/LCD display, back lighted.

2. System acknowledge, signal silence, and system reset touchpad control switches.

3. Time/date display.

4. Integral sounder with subsequent alarm/trouble resound.

5. Flush mounting.

B. Transponders:

1. Up to 26 field configurable circuits of any mix.

2. Full LED/LCD display of alarm and trouble per point.

3. Status displays and controls including power, on-line, local alarm and local trouble LED/LCD's plus reset and lamp test switches.

4. Power supply, charger and battery as required for control panel.

C. Lamp Driver Modules:

1. Field selectable alarm and trouble or alarm only.

2. Integral system trouble lamp on-line/power LED/LCD, alarm and trouble resound with flash function of new events, serial RS-485 interface to control panel, capable of being powered remotely or locally with supervision.

3. Integral lamp test function.

D. Power supplies, with integral chargers and batteries current limited low energy as recommended by the manufacturer but sized for 25 percent spare capacity.

2.8 DETECTION DEVICES

A. Analog photoelectric smoke detectors provide for individual addressing of each detector. Sensor is constantly monitored to measure change in its sensitivity due to the environment caused by dirt, aging, temperature, humidity, etc.

B. Give an advanced indication to the control panel of the need for maintenance and can be specific as to where the maintenance is needed . It is to be mounted on a two wire standard device base. Photoelectric detectors located within the elevator shaft rated for installation within a pressurized shaft.

C. Duct smoke detector housing assemblies accommodate the mounting of an analog/addressable detector along with a standard, relay or isolator detector mounting base. Housing protects the measuring chamber from damage and insects. Utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to twelve feet. Provide drilling templates and gaskets to facilitate locating and mounting the housing.

1. Provide sampling tube length as required to accommodate air duct width.

2. Provide remote status/alarm LED indicator and keyswitch test station for each duct smoke detector.

3. Duct smoke detector air velocity range includes design air velocity of the ductwork in which the duct smoke detector is to be installed.

D. Analog thermal detectors consist of a dual thermistor sensing circuit for fast response. Sensor is continually monitored to measure changes in their sensitivity due to temperature. Advanced indication to the control panel of the need for maintenance and can be specific as to where the maintenance is needed. Mount on a two wire standard device base. Equip thermal detectors in elevator shafts and machine rooms with a set of auxiliary contacts for elevator equipment use. Rate thermal detectors located within elevator shaft for installation within a pressurized shaft.

E. Projected Beam Type Smoke Detectors:

1. 4-wire 24 VDC and powered from the control panel four-wire smoke power source.

2. Consists of a separate transmitter and receiver capable of being powered separately or together.

3. Operate in either a short range of 30-feet to 100-feet or a long range of 100-feet to 300-feet.

4. Feature a bank of four alignment LEDs on both the receiver and transmitter that are used to ensure proper alignment without the use of special tools.

5. The beam detector features automatic gain control that compensate for gradual signal deterioration from dirt accumulation on lenses. Ceiling or wall mount as shown on the drawings. Carry out testing out using calibrated test filters. Provide a key activated remote test station.

6. Provide monitor modules for alarm and trouble and control relay module for reset.

F. Provide addressable monitor modules an address for a single, normally open initiating device such as a waterflow switch, manual station, etc. UL approved to extend the sensor loop to lengths up to 2,500-feet.

2.9 ANNUNCIATION DEVICES

A. Horn and Combination Horn/Strobe:

1. Mount to a recessed box with an extension ring.

2. Front of the unit allows for candela light levels as required by ADA for the spacing as installed.

3. Horns provide a 100 dba peak sound output with field adjustable output level.

4. Finish: White

B. Strobe Lights:

1. Triangular with FIRE on white plastic lens, polarized 24 VDC, mounting single gang on four square box.

2. Front of the unit allows for candela light levels as required by ADA for the spacing as installed.

3. Strobe candela level adjustable field from 15-110 CD.

4. Mount at 80-inches or as shown on drawings.

5. Finish: White

C. The candela rating of each strobe installed apparent to the Fire Marshal and to qualified service personnel either as installed or with the removal of the faceplate. If faceplates are interchangeable between strobes of different ratings the indication of candela rating not on the faceplate.

2.10 ELECTROMAGNETIC DOOR HOLDERS

A. Equipment consists of an armature contact plate with adjustable pivot mount, install on door. Mount behind the door on the wall or floor a heavy-duty electromagnet, in a durable enclosure.

B. Fail-Safe operation, loss of power releases the door holder for the door to close.

C. Unit accepts 12VDC, 24VAC/VDC or 120VAC. Coordinate voltage by the fire alarm system installer/supplier. Circuitry required for the systems operation provided by the system installer.

D. Door holder equipment of the same manufacturer as the fire alarm system to ensure system compatibility and proper UL compatibility listings.

2.11 ADDRESSABLE ACCESSORIES

A. Control Modules:

1. Connects to the same loop as the initiating devices and provides a form C relay contact.

2. Program module to transfer from either a trouble or alarm input from any or combination of any addressable device.

2.12 CONTROLLED DEVICES

A. Mechanical control system for control of air handlers and smoke/fire rated dampers.

B. Fire protection tamper, flow, dry system and preaction system.

2.13 CABLE

A. Plenum rated as recommended by System Manufacturer and the building construction methods.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:

1. Install in accordance with code, UFC, UBC, NFPA 72, 101 and the manufacturer's instructions.

2. Review proper installation of each type of device with manufacturer's agent.

3. Install wiring, raceway and outlet boxes required for a complete system as indicated in the Contract Documents.

4. Comply with applicable requirements of Section 26 05 33, Raceways and Boxes for Electrical Systems, for boxes and surface mounted raceways.

B. Typical Wiring:

1. Install manufacturer's recommended listed cable to connect devices as recommended by the manufacturer.

2. Run cable in conduit where exposed to physical damage.

C. Detectors:

1. Locate 48-inches clear of supply air vents and 12-inches clear of lights and sprinkler heads.

2. Install detector heads not more than two weeks prior to substantial completion. Verify the design locations shown conform to the actual construction.

3. Do not locate detectors in close proximity to air supply vents.

4. Bring cases of uncertain applicability to the attention of the Architect for resolution prior to roughing in.

D. Duct Smoke Detectors

1. Provide/maintain working access to duct smoke detectors.

2. Locate duct smoke detectors in accordance with code requirements. Locations must ensure adequate airflow within the duct housing.

3. Locate remote status/alarm LED indicator and keyswitch test station at readily accessible location out of general viewdirectly below duct smoke detector location. Identify locations on fire alarm shop drawings prior to installation.

E. Install remote annunciator as indicated on plans and where required by Fire Marshal. Coordinate prior to rough-in.

F. Provide auxiliary power supplies as required and extend the 120V power to the power supply as required and per NEC.

G. Provide visual devices and alarm devices as required. Device locations are diagrammatic showing intent of area coverage. The exact placement, sound or light level is to be per the requirements and the listing of the manufacturer's equipment.

3.2 LABELING

A. Label alarm initiating devices with 1/2-inch by 1-inch lamicoid nameplates, indicating control panel point designation. Locate nameplates in the vicinity of the device as approved by the Owner.

B. Provide Brady type wire markers to identify conductors at each junction or terminal. Use numbers indicated on the wiring diagrams.

3.3 TESTS

A. Provide the service of a competent, factory-trained technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during the programming, final connections, adjustments and tests for the system.

B. When the system is complete and prior to the substantial completion, furnish testing equipment and perform the following tests:

C. Before energizing system, check for correct wiring connections and test for short circuits, ground faults, continuity, and insulation.

D. Test the insulation on installed wiring by standard methods as recommended by the equipment manufacturer.

E. Open supervised circuits to see if the trouble signal activates.

F. Ground supervised circuits and verify response of trouble signals.

G. Check installation, supervision, operation, and sensitivity of smoke detectors as recommended by the manufacturer to ascertain that they will avoid false alarm signals yet provide the required automatic detection.

H. Test each device for proper operation and auxiliary function.

I. Submit a print out of the entire test procedure to the engineer with the letter of certification for the completed fire alarm system.

J. When defects in the work are detected, make repairs and repeat the tests as required.

K. Test system for NFPA standby and alarm runtime for the actual load on the system batteries and recharge time of system batteries.

L. Perform required and necessary verification of the system operating functions with the Architect and Owner's facility staff prior to turnover of the complete system for final test observed by the Fire Department. Perform tests in the presence of the Owner or the Owner's Representative. A System Certification verifying the proper system operation is required prior to acceptance. Instruct Owner's personnel in system operation, maintenance and programming for a minimum of 20 hours. The cost of retesting as a result of the failure of the system to operate in accordance with these specifications, drawings, or applicable codes paid for by the contractor to the Owner.

3.4 WARRANTY SERVICE AND INSTRUCTION

A. The fire alarm system will be checked on a monthly basis by the fire alarm system service organization for a period of one year after beneficial occupancy. The monthly checks will consist of reviewing the operation of the system with the Owner's operating and maintenance personnel, providing additional hands on instruction, and assisting in execution of programming revisions. Each monthly visit will consist of not less than two hours of on-site time and no more than four hours. The monthly visits will be scheduled with the Owner not less than one week in advance.

3.5 EXTRA STOCK/SPARE PARTS

A. Provide the following equipment to be turned over to the owner with the operation and maintenance manuals.

1. Two photoelectric smoke detector heads
2. Two thermal heat detector heads
3. One addressable dry contact modules
4. Two horns
5. Two horns/strobes
6. One manual pull stations
7. One complete set of fuses to match panel counts

3.6 TRAINING

A. Provide operation and maintenance training for Owner's personnel.

B. Conduct a minimum of two maintenance training sessions upon completion of the work. Maintenance training sessions include a walk-thru of the completed facilities identifying the location, address, and means of access to every device monitored by the fire alarm system.

C. Conduct training sessions for two operator levels.

D. Operator training. Provide a minimum of three refresher and system update training sessions of on-the-job training.

E. Supervisor training. Provide a system update training session for supervisory functions.

F. Training sessions with fully qualified, trained representative, of the equipment manufacturer who is thoroughly knowledgeable of the specific installation.

END OF SECTION

SITE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of:

1. Retaining walls.
2. Ramps.
3. Curbs and gutters.
4. Walks.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

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

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

E. Material Test Reports: For aggregates.

F. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

E. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

D. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, gray portland cement Type I. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4M, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Axim Italcementi Group, Inc.; Caltexol CIMFILM.

b. BASF Construction Chemicals, LLC; Confilm.

c. ChemMasters; Spray-Film.

d. Conspec by Dayton Superior; Aquafilm.

e. Dayton Superior Corporation; Sure Film (J-74).

f. Edoco by Dayton Superior; BurkeFilm.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Anti-Hydro International, Inc.; A-H Curing Compound #2 DR WB.

b. ChemMasters; Safe-Cure Clear.

c. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).

d. Euclid Chemical Company (The), an RPM company; Kurez W VOX.

e. Kaufman Products, Inc.; Thinfilm 420.

f. Lambert Corporation; AQUA KURE - CLEAR.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi.

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.

3. Slump Limit: 4 inches, plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 4-1/2 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.

D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

E. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 requirements as follows:

1. Fly Ash or Pozzolan: 25 percent.

2. Ground Granulated Blast-Furnace Slag: 50 percent.

3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.

2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.

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

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.

2. Provide tie bars at sides of paving strips where indicated.

3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.

2. Extend joint fillers full width and depth of joint.

3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.

4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.

a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

L. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 DETECTABLE WARNINGS

A. Stamped Detectable Warnings: Install stamped detectable warnings as part of a continuous concrete paving placement and according to stamp-mat manufacturer's written instructions.

1. Before using stamp mats, verify that the vent holes are unobstructed.

2. Apply liquid release agent to the concrete surface and the stamp mat.

3. Stamping: While initially finished concrete is plastic, accurately align and place stamp mats in sequence. Uniformly load, gently vibrate, and press mats into concrete to

produce imprint pattern on concrete surface. Load and tamp mats directly perpendicular to the stamp-mat surface to prevent distortion in shape of domes. Press and tamp until mortar begins to come through all of the vent holes. Gently remove stamp mats.

4. Trimming: After 24 hours, cut off the tips of mortar formed by the vent holes.

5. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.

2. Thickness: Plus 3/8 inch, minus 1/4 inch.

3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.

4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.

5. Lateral Alignment and Spacing of Dowels: 1 inch.

6. Vertical Alignment of Dowels: 1/4 inch.

7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.

8. Joint Spacing: 3 inches.

9. Contraction Joint Depth: Plus 1/4 inch, no minus.

10. Joint Width: Plus 1/8 inch, no minus.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.

   a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

PAVEMENT MARKING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of traffic lane and parking stall striping, handicap symbols painting, directional word and directional arrow painting, and surface applied detectable warning tiles.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1 Section “Submittal Procedures.”

B. Product data sheets with surface preparation, application instructions, and clean-up information.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not apply marking paint when wind velocity exceeds 15 mph.

B. Do not apply marking paint when pavement temperature is less than 40°F, and ambient air temperature is less than 45°F.

1.5 SCHEDULING

A. Perform pavement marking work after installation and curing concrete curbs, and walks.

B. Perform pavement marking work after curing and sealing asphaltic concrete pavement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Traffic Marking Paint:

1. Fuller O'Brien: Traffic Line Paint, 382 Series, white, yellow, and blue.

2. General: Tru-Test Supreme Zone Marking Paint, white, yellow, and blue.

3. Miller: Acrylic Traffic Zone Paint, 8000 Series, white, yellow, and blue.

4. PPG Industries: Pittsburgh Traffic and Zone Marking Paint 22 Line, white, yellow, and blue.

5. Rodda: Traffic Paint, white, yellow, and blue.

6. Sherwin-Williams: Setfast Latex Traffic Marking Paint, low VOC acrylic, white, yellow, and blue.

B. Detectable Warning Tiles: TufTile, 888-960-8897.

C. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Division 1 Section “Product Requirements.”

2.2 PAINT MATERIALS

A. Paint shall comply with industry standard AASHTO M248, Type 3F.

2.3 PAINT EQUIPMENT

A. Apply paint with motor powered atomizing spray striping machine.

B. Adjust pavement marking equipment controls to level required to apply required mil thickness.

2.4 DETECTABLE WARNING TILES

A. Product: Tuftile Polymer Tiles are made of advanced proprietary polymers and are engineered with molded in-line truncated domes which are in full compliance with ADA guidelines and provide superior impact and slip resistance.

1. Color: Yellosw.

B. Edge Transitions: TufTile “Surface Applied Beveled Edges” provide smooth transition between the TufTile and other surfaces.

1. Meets ADA requirements.

C. Fastening System:

1. 1-1/2" tamper-resistant stainless steel #14 screws secure each anchor to the tile.

2. Polymer Surface-Applied anchors hold tight to stainless steel.

3. Optional Anchor Drive Pins are available, depending on location and installation regulations.

4. Adhesive: Weather resistant TufTile SA sealant is applied to the back.

PART 3 EXECUTION

3.1 PROTECTION AND PREPARATION

A. Protection: Place temporary barricade and rope or plastic cone barriers to keep vehicular traffic off striping until paint is dry.

B. Surface Preparation:

1. Pressure wash pavement surface and blow dry wet areas prior to applying paint.

2. Architect will review line and symbol layout prior to starting striping work.

3.2 PAVEMENT STRIPING

A. Spray-apply paint with straight edges, true alignment, and uniform wet film thickness of 17 mils with thickness variation not to exceed 2 mils.

B. Form handicap symbols, words, and arrows with templates. Handicap symbols shall be white with blue background.

C. Apply white paint to pavement areas.

D. Apply yellow paint to curbs and no parking striped pavement areas.

E. Apply parking area striping in 4-inch-wide lines.

3.3 DETECTABLE WARNING TILES

A. Install in accordance with manufacturer's printed instructions.

3.4 ADJUSTING

A. Remove misplaced marking paint from concrete surfaces.

B. Cover misplaced paint on asphaltic concrete with asphalt emulsion.

END OF SECTION

Woodburn City Hall

REMODEL & HVAC UPGRADE

100% CD Drawings
December 14, 2018

deca
ARCHITECTURE.INC

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tel 503 239 1987 **fax** 503 239 6558

ABBREVIATIONS

(E)	EXISTING	OC	ON CENTER
(N)	NEW	OCC, OCCS	OCCUPANT(S)
ACT	ACOUSTIC CEILING TILE	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
ALUM	ALUMINUM	OD	OVERFLOW DRAIN
BD	BOARD	OPP	OPPOSITE
CF	CEILING FAN OR CLEAR FINISH	P, PT	PAINT
CJ	CONTROL JOINT	PH	PHONE
CG	CORNER GUARD	PL	PLASTIC LAMINATE
CH	CHAIR, COAT HOOK	PLY	PLYWOOD
CL	CLOCK	PT	PAINT
CLR	CLEAR	PTD	PAINTED
CONC	CONCRETE	RB	RUBBER BASE
CPT	CARPET	RD	ROOF DRAIN
CT	CERAMIC TILE	RDOD	ROOF DRAIN OVERFLOW DRAIN
CTB	CERAMIC TILE BASE	REQ'D	REQUIRED
CTG	CLEAR TEMPERED GLAZING	REV	REVISE, REVISION
CR	CARD READER, CURTAIN ROD	RF	RESILIENT FLOORING
DEMO	DEMOLITION; DEMOLISH	S4S	SURFACED FOUR SIDES
EF	EXHAUST FAN	SAN	SANITARY (SEWER)
EH	ELECTRIC HEATER	SHD	SHADE
FC	FAN COIL	SIM	SIMILAR
FDC	FIRE DEPARTMENT CONNECTION	SN	SIGN
FEC	FIRE EXTINGUISHER CABINET	SSTL	STAINLESS STEEL
FO	FACE OF	ST	STONE
FRP	FIBER REINFORCED PLASTIC	STC	SOUND TRANSMISSION COEFFICIENT
FS	FLOOR SINK	STL	STEEL
FWP	FABRIC WRAPPED PANEL	T	TELEPHONE
GA	GAUGE	TBD	TO BE DETERMINED
GSF	GROSS SQUARE FEET/FOOTAGE	TEL	TELEPHONE
GYP	GYPSUM BOARD	TYP	TYPICAL
HM	HOLLOW METAL	UL	UNDERWRITERS LABORATORIES
HP	HEAT PUMP	UNO	UNLESS NOTED OTHERWISE
KDF	KNOCKDOWN FRAME	VFD	VARIABLE FREQUENCY DRIVE
KE	KITCHEN EQUIPMENT	W/	WITH
LWC	LINEAR WOOD CEILING	WC	WATER CLOSET, WINDOW COVERING
MIN	MINIMUM	WB	WOOD BASE
MFR	MANUFACTURER('S)	WD	WOOD
MTL	METAL	WG	WATER GAUGE
MR	MIRROR	WH	WATER HEATER
MISC	MISCELLANEOUS	WM	WALK-OFF MAT
NC	NOISE CRITERIA	WP	WOOD PANELING
NSF	NET SQUARE FEET/FOOTAGE		

SYMBOLS LEGEND

EXISTING CONSTRUCTION

NEW CONSTRUCTION – FULL HEIGHT

NEW CONSTRUCTION – PARTIAL HEIGHT

EXISTING CONSTRUCTION TO BE REMOVED

GRID OR CENTER LINE

PROPERTY LINE

FE BRACKET MOUNTED FIRE EXTINGUISHER

DUPLEX WALL RECEPTACLE

FOUR-PLEX WALL RECEPTACLE

WP WEATHER PROTECTED EXTERIOR RECEPTACLE

+XX" RECEPTACLE XX" ABOVE FINISH FLOOR

RECEPTACLE AT CEILING

COMBINATION TEL/DATA OUTLET W/ (3) CAT-6 RJ-45 JACKS AND (3) CAT-6 CABLES, STUB CONDUIT TO ACCESSIBLE CEILING LOCATION

EXIT SIGN

GENERAL NOTES

1. DRAWINGS OF EXISTING BUILDING FOR REFERENCE ONLY, CONTRACTOR TO VERIFY ALL CONDITIONS IN FIELD. ACTUAL CONDITIONS MAY VARY.
2. ALL WORK SHALL COMPLY WITH APPLICABLE BUILDING, PLUMBING, MECHANICAL, ELECTRICAL, AND FIRE CODES.
3. IN PERFORMING PROFESSIONAL SERVICES FOR THIS PROJECT, DECA ARCHITECTURE, INC. ISSUES, EXPRESSES OR IMPLIES NO WARRANTIES OR CERTIFICATIONS.
4. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND REPORT ANY DISCREPANCIES TO THE ARCHITECT.
5. CONTRACTOR IS RESPONSIBLE FOR ALL MEANS AND METHODS OF CONSTRUCTION INCLUDING ANY REQUIRED SHORING.
6. CONTRACTOR SHALL VERIFY THAT ALL MEP WORK IS COORDINATED AND DESIGNED TO FUNCTION WITH THE EXISTING BUILDING'S SYSTEMS.
7. CONTRACTOR SHALL PROTECT EXISTING OCCUPANTS AND PROPERTY FROM DAMAGE DURING PERFORMANCE OF WORK.
8. CONTRACTOR TO SUBMIT ALL FINISHES AND MATERIALS TO ARCHITECT AND OWNER FOR REVIEW PRIOR TO ORDERING.
9. I.T. DEPARTMENT ACCESS TO THE BUILDING SHALL BE PROVIDED FOR CITY STAFF ONLY. INTERMITTENT ACCESS WILL BE REQUIRED.

PROJECT CONTACTS

BUILDING OWNER/CLIENT:
City of Woodburn Public Works
190 Garfield Street
Woodburn, OR 97071
Contact: Eric Liljequist (503) 982-5241

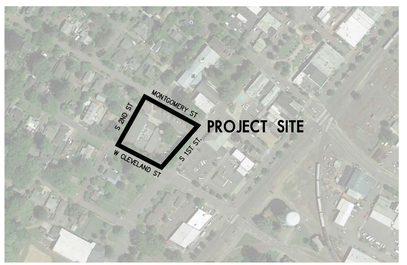
ARCHITECT:
DECA Architecture
935 SE Alder St.
Portland, OR 97214
Contact: Shem Harding (503) 239-1987

STRUCTURAL ENGINEER:
KPFF Consulting Engineers
111 SW 5TH AVE Suite 2500
Portland, OR 97204
Contact: Jerry Abdie (503) 227-3251

MEP ENGINEERING:
PAE Engineering
525 SW 5th Avenue Suite 1500
Portland, OR 97204
Contact: Brian Coffield (503) 226-2921

AUDIOVISUAL SYSTEM DESIGN:
Delta AV
2450 NW Eleven Mile Ave
Gresham, OR 97030
Contact: Brad Robison (503) 907-0137

VICINITY MAP



PROJECT DESCRIPTION

THIS PROJECT INCLUDES REMODELING THE EXISTING CITY HALL BUILDING AND PROVIDING A NEW HVAC SYSTEM. WORK INCLUDES NEW AND ALTERED WALLS, DOORS, FINISHES, CEILING, LIGHTING AND OTHER ARCHITECTURAL ELEMENTS THROUGHOUT MOST OF THE BUILDING. THE EXISTING HVAC SYSTEM WILL BE REMOVED AND A NEW HVAC SYSTEM INSTALLED. NO CHANGE OF OCCUPANCY IS PROPOSED.

EXTERIOR WORK INCLUDES NEW HVAC UNITS, ROOFING, ROOF WELL CLADDING AND SELECT SITE ADA IMPROVEMENTS.

I.T. DEPARTMENT AREAS ARE TO REMAIN OPERATIONAL DURING CONSTRUCTION, AND REMODELING IN THAT AREA WILL BE MINIMAL.

BID ALTERNATES

1. PROVIDE A DEDUCT ALTERNATE COST FOR LEAVING EXISTING VISIBLE CONDITIONS IN LOCKER ROOMS 152 AND 155 AND ADJACENT RESTROOMS AND SHOWER AREAS AS-IS. THIS INCLUDES LEAVING EXISTING FLOORING, SHOWERS AND LIGHTING AS-IS. MECHANICAL SYSTEM TO BE MODIFIED AS SHOWN ON PLANS.
2. PROVIDE A DEDUCT ALTERNATE COST FOR NOT EXTENDING EXISTING WALLS TO STRUCTURE ABOVE, AS CALLED FOR IN OFFICES 108, 110, 115, AND 136.
3. PROVIDE A DEDUCT ALTERNATE COST FOR LEAVING EXISTING WALL CLADDING AT MECHANICAL WELL AS-IS IN LIEU OF REPLACING WITH NEW CLADDING.
4. PROVIDE A DEDUCT ALTERNATE COST FOR REMOVING FAN-COIL UNITS, SUPPLY/RETURN DUCTING AND DIFFUSERS FROM BASEMENT ROOMS 001, 003, 005, 007, 008, 009 AND 010.

DRAWING INDEX

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REGISTERED ARCHITECT
2919
DAVID T. HYMAN
PORTLAND, OREGON
STATE OF OREGON

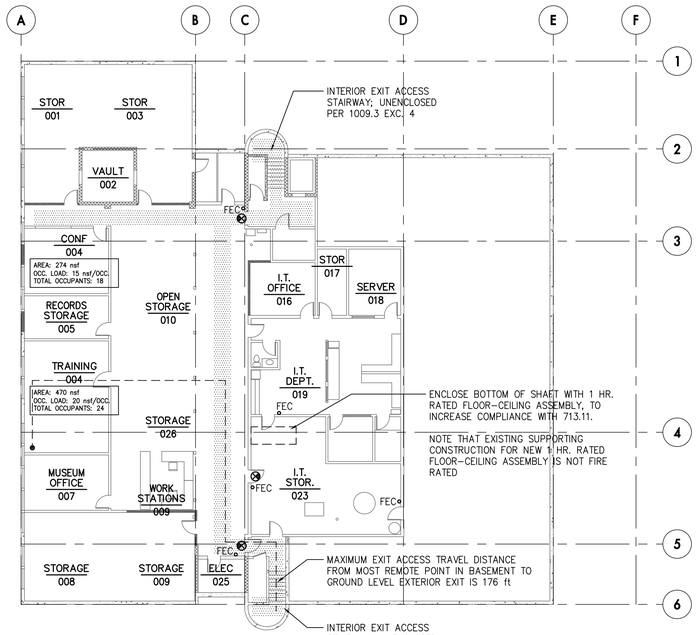
WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

DRAWING INDEX, PROJECT CONTACTS AND LEGEND

Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. G001

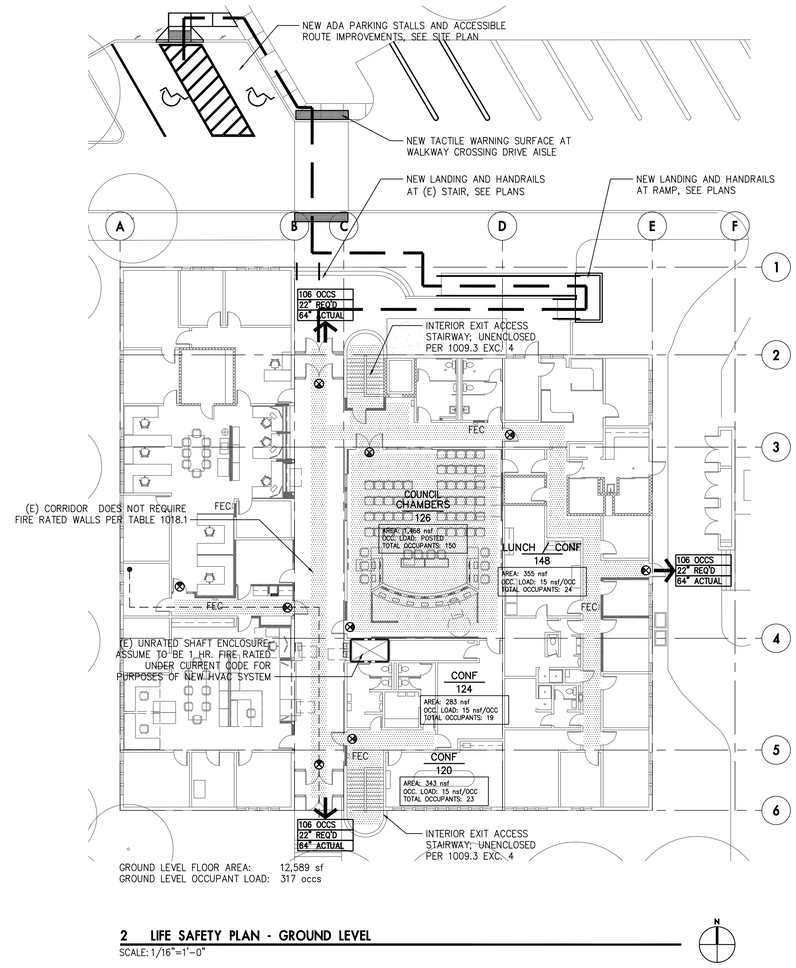


BASEMENT FLOOR AREA: 8,375 sf

BASEMENT OCCUPANT LOAD: 118 occs

1 LIFE SAFETY PLAN - BASEMENT

SCALE: 1/16"=1'-0"



GROUND LEVEL FLOOR AREA: 12,589 sf

GROUND LEVEL OCCUPANT LOAD: 317 occs

2 LIFE SAFETY PLAN - GROUND LEVEL

SCALE: 1/16"=1'-0"

BIDDER DESIGN / DEFERRED SUBMITTAL

1. SUBMIT DESIGN FOR ALL BIDDER DESIGNED (DESIGN-BUILD) SYSTEMS TO ARCHITECT FOR APPROVAL PRIOR TO FABRICATION, ORDERING OR INSTALLATION. SUBMIT SHOP DRAWINGS, PRODUCT DATA, SPECIFICATIONS, AND ANY OTHER MATERIAL NECESSARY TO DESCRIBE THE WORK.
2. BIDDER DESIGNER TO SUBMIT ANY REQUIRED MATERIALS TO AHJ AND OBTAIN SEPARATE PERMITS REQUIRED FOR BIDDER DESIGNED WORK. ALL BIDDER DESIGNED WORK TO COMPLY WITH ALL APPLICABLE CODE AND REGULATIONS.
3. ANY DEFERRED SUBMITTALS REQUIRED BY THE AHJ TO BE SUBMITTED BY BIDDER DESIGNER.
4. BIDDER DESIGNER TO PROVIDE ANY ENGINEERING REQUIRED BY THE AHJ RELATED TO BIDDER DESIGNED WORK.

BIDDER DESIGNED SYSTEMS / ITEMS:

FIRE SPRINKLER SYSTEMS (SEE MEP)
FIRE ALARM SYSTEMS (SEE MEP)
MECHANICAL UNIT ATTACHMENT TO PRIMARY STRUCTURE (SEE STRUC)

LIFE SAFETY PLAN LEGEND

86 OCCS
44" REQ'D
48" ACTUAL
EGRESS TAG SHOWING OCCUPANT LOADING AND WIDTH FOR A GIVEN EXIT

FE
FIRE EXTINGUISHER LOCATION

EXIT SIGN

HATCH INDICATES MEANS OF EGRESS PATH, MIN. 44" WIDE, LIT TO MIN. 1 FOOTCANDLE AVERAGE AT FLOOR LEVEL

MAXIMUM EXIT ACCESS TRAVEL DISTANCE

1 HR. FIRE RATED WALLS

ACCESSIBLE ROUTE

ZONING CODE REQUIREMENTS

PROJECT ADDRESS:	270 MONTGOMERY ST. WOODBURN, OR 97071
PROPERTY ID: TAX LOT: MAP NO.:	R108129 051W18BA06400 05 1W 07CB WOODBURN
ZONING	DDC (DOWNTOWN DEVELOPMENT AND CONSERVATION)
URBAN RENEWAL NEIGHBORHOOD CONS.	YES NO
SITE AREA: BUILDING COVERAGE:	42,635 sf / 0.98 acres 12,957 sf (30%)
BUILDING HEIGHT:	1 STORY W/ BASEMENT

NOTES:

1. NO CHANGE OR EXPANSION OF EXISTING USES ARE PROPOSED
2. ROOFTOP EQUIPMENT WILL BE SCREENED FROM VIEW BY EXISTING ROOF FORMS

BUILDING CODE REQUIREMENTS

Applicable Codes
2014 Oregon Structural Specialty Code (2012 IBC w/ amendments)
2014 Oregon Energy Efficiency Specialty Code (2009 IECC)
2014 Oregon Fire Code (2012 IFC)
2014 Oregon Mechanical Specialty Code (2012 IMC w/ amendments)
2017 Oregon Electrical Specialty Code (2017 NFPA 70 NEC w/ amendments)
2017 Oregon Plumbing Specialty Code (2015 UPC w/ amendments)

Building Area:

Level 1	12,589 gsf
Basement	8,375 gsf
Total	20,964 gsf

302 Occupancy
Existing: A-3 (Council Chambers)
B (City Hall)

No change to existing occupancies is proposed

503 Allowable Height and Area
No change in building area or height proposed.

	A-3 (most restrictive)
Tabular Area (type VB)	6,000
Frontage Increase	If = 0.75
Sprinkler Increase	Is = 2.0 (building is sprinklered)
Allowable Area per Story	22,500
Allowable Height	2 stories (building is sprinklered)

508.3 Nonseparated occupancies: the building shall be considered as a nonseparated occupancy, since it complies with the allowable area and height for the most restrictive occupancy

602 Construction Classification
Construction type: V-B (sprinklered)

903 Automatic Sprinkler Systems
903.2.1.3 sprinklers shall be provided for A-3 fire areas exceeding 12,000 sf

The building is fully sprinklered per NFPA 13 requirements

1006 Means of Egress Illumination
Means of egress to be illuminated to 1 footcandle at walking surface at all times the building is occupied. A maximum to minimum uniformity ratio of 40 to 1 shall not be exceeded. Backup power for emergency lighting shall be provided for a minimum of 90 minutes.

1016 Exit Access Travel Distance
Per table 1016.2 maximum exit access travel distance in a sprinklered building is 300 ft for B occupancy.

1018 Corridors
Per table 1018.1, corridors in A and B occupancies equipped with a sprinkler system are not required to be rated.

1604 Risk Category
Per table 1604.5, this building is a category II building. The primary occupancy is not public assembly, and the building is not an essential facility.

2901 Plumbing Fixtures

	M. WC*	W. WC	M. Lavs	W. Lavs	DF
A-3 (75 M./75W.)	0.6	1.2	1.0	1.0	1 per floor
B (143 M./143 W.)	3.9	3.9	2.8	2.8	
Total req'd fixtures	4.5	5.1	3.8	3.8	1 ground level
Proposed fixtures	6.64	6.0	5.0	5.0	1 ground level

*urinals counted at 0.66 of a water closet per OSSC Table 2904.2

3411 Accessibility for Existing Buildings
Per OSSC 3411 and ORS 447.241, paths of travel to the altered area shall be made readily accessible within the limits of 447.241(2) and in accordance with the priorities stated in 447.241(4). Proposed accessibility improvements include:

-New ADA van parking stalls & signage (see site plan)
-New tactile warning strips where accessible route crosses drive aisle (see site plan)
-New handrails at main entry monumental stair (see site plan)
-New accessible public restrooms at north end of building
-New accessible counters at Cashiers and Community Development
-New accessible drinking fountains in main hallway
-New accessible dais and dais platform

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REGISTERED ARCHITECT 2919 DAVID T. HYMAN PORTLAND, OREGON STATE OF OREGON

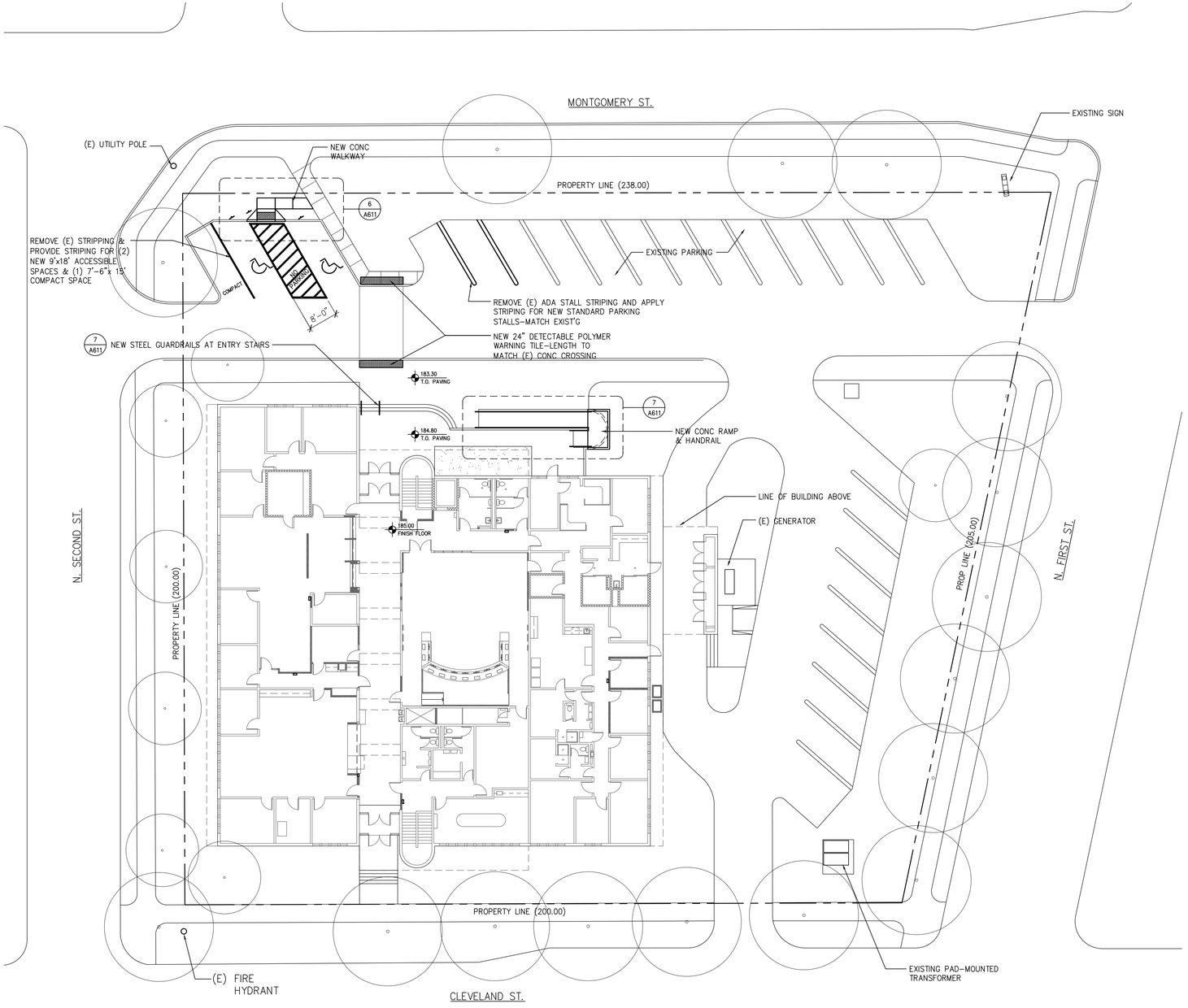
WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

LIFE SAFETY PLAN & CODE SUMMARY

Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. G002



1 ARCHITECTURAL SITE PLAN

SCALE: 1/16" = 1'-0"

TNN

NOTES THIS SHEET

1. FILED VERIFY ALL EXISTING SITE CONDITIONS, INCLUDING UTILITIES, PAVING, LANDSCAPING AND OTHER ELEMENTS THAT MAY AFFECT SITE WORK.
2. PROTECT ALL EXISTING LANDSCAPING AND TREES IN AREAS OF WORK. ANY DISTURBED LANDSCAPING IS TO BE REPLACED W/SIM.
3. PROVIDE EROSION CONTROL MEASURES AS REQUIRED BY AHJ
4. CONTRACTOR IS RESPONSIBLE FOR SURVEYING AND LAYOUT. NOTIFY DESIGN TEAM OF ANY CONFLICTS.
5. ALL NEW PARKING MARKINGS & SIGNAGE ARE TO BE COMPLIANT WITH OREGON STATUTE (ORS) 447.233, THE OREGON TRANSPORTATION (OTC) STANDARDS FOR ACCESSIBLE PERSON PARKING SPACES.

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STATE OF OREGON

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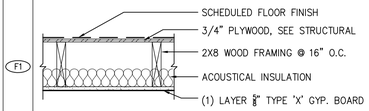
Issue	Revision	Date
100% CD		12/14/18

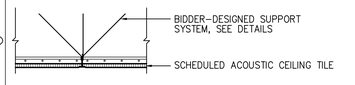
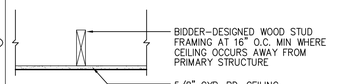
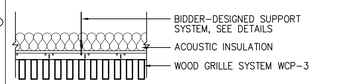
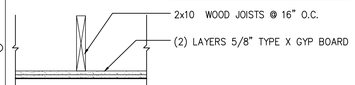
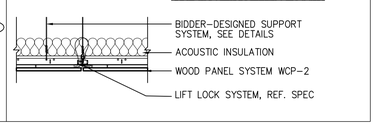
ARCHITECTURAL SITE PLAN

Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. A001

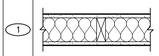
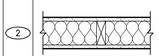
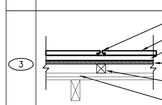
FLOOR ASSEMBLIES

TAG	DESCRIPTION
F1	

CEILING ASSEMBLIES

TAG	DESCRIPTION
C1	SUSPENDED ACOUSTIC TILE CEILING 
C2	FRAMED GYP BOARD CEILING 
C3	SUSPENDED WOOD GRILLE CEILING 
C4	GYP BOARD CEILING, 1 HR. FIRE RATED 
C5	SUSPENDED WOOD PANEL CEILING 

WALL ASSEMBLIES

TAG	DESCRIPTION
1	INTERIOR WALL  2X4 WOOD STUDS @ 16" O.C. ACOUSTIC INSULATION 5/8" TYPE X GYP BOARD BOTH SIDES
2	INTERIOR WALL – 1-HR FIRE RATED  2X4 WOOD STUDS @ 16" O.C. ACOUSTIC INSULATION 5/8" TYPE X GYP BOARD BOTH SIDES REF. GA-600, ASSEMBLY WP 3510
3	

WALL ASSEMBLY NOTES:

1. ALL WALLS EXTEND TO UNDERSIDE OF STRUCTURE ABOVE, UNO.
2. PROVIDE DEFLECTION HEADS AT ALL WALLS EXTENDING TO STRUCTURE.
3. WHEN FRAMING CONTINUES PAST INTERMEDIATE STRUCTURE, ATTACHMENT TO STRUCTURE SHALL BE WITH A SLOTTED CONNECTION OR OTHER MEANS TO PREVENT TRANSFER OF STRUCTURAL DEFLECTION LOADING.
4. WHERE NEW WALLS ARE MEANT TO INFILL OR ALIGN WITH EXISTING CONDITIONS, VERIFY EXISTING DEPTH AND PROVIDE ALTERNATE STUD SIZE AND/OR LAYERS OF GYP BOARD AS NEEDED.

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REGISTERED ARCHITECT
2919
DAVID T. HYMAN
PORTLAND, OREGON
STATE OF OREGON

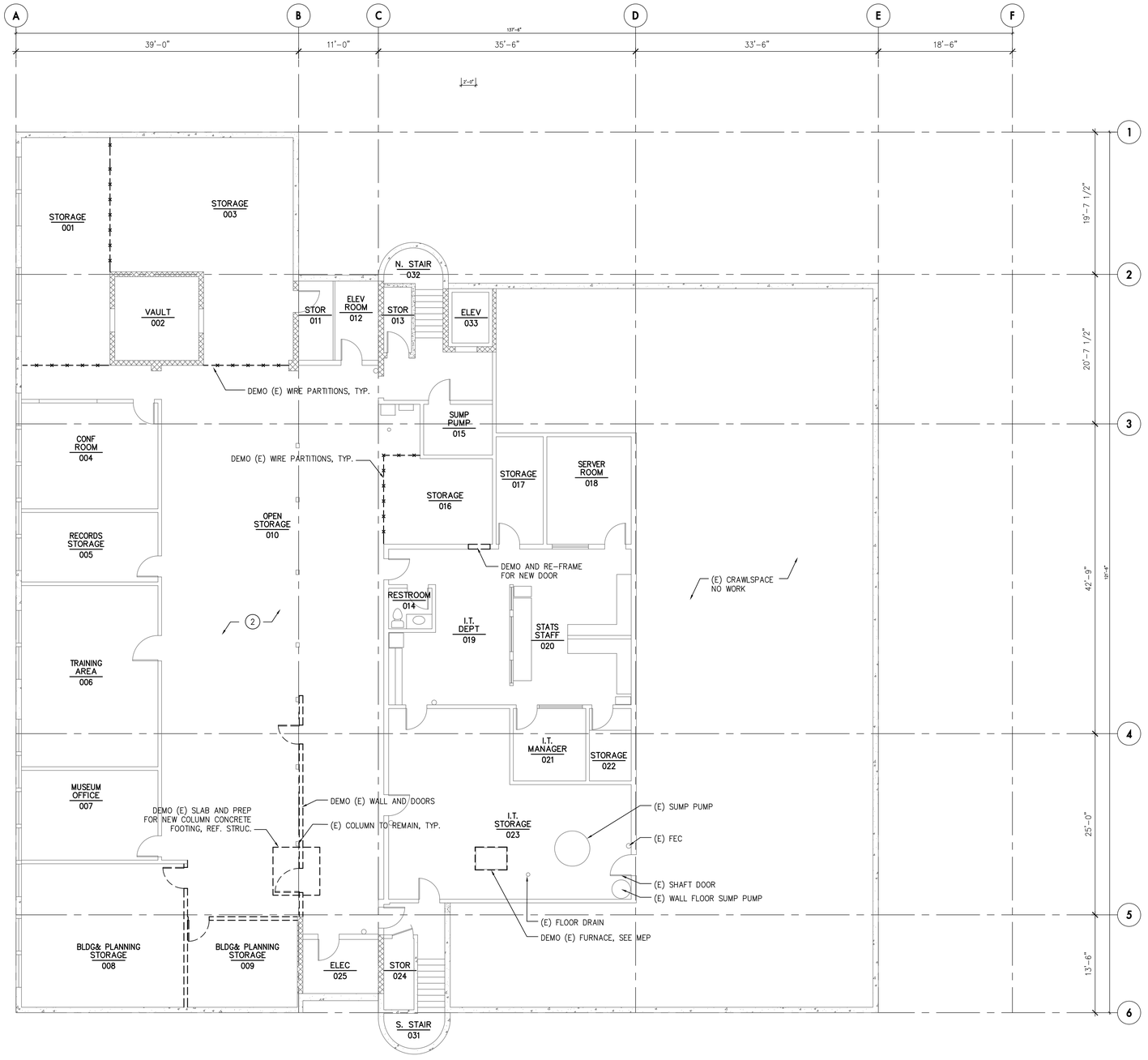
WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

WALL ASSEMBLIES
CEILING ASSEMBLIES

Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. A002



1 DEMOLITION FLOOR PLAN - BASEMENT
SCALE: 1/8" = 1'-0"

NOTES THIS SHEET

1. REMOVE ALL EXISTING FLOOR, CEILING AND WALL FINISHES AS REQUIRED TO PREPARE FOR INSTALLATION OF NEW CONSTRUCTION
2. REMOVE ALL EXISTING WALL OUTLETS, SWITCHES, LIGHTING & HVAC CONTROLS IN AREAS OF NEW CONSTRUCTION
3. ALL DEMOLITION CUTS ARE TO BE CLEAN & STRAIGHT. NO OVER CUTTING AT CORNERS.
4. ALL PAINTED SURFACES IN AREAS OF NEW CONSTRUCTION TO BE PREPPED TO RECEIVE NEW PAINT.
5. OWNER WILL REMOVE ALL EXISTING FURNITURE & EQUIPMENT NOT FIXED IN PLACE
6. CONTRACTOR RESPONSIBLE FOR REMOVING & REINSTALLING ALL EXISTING FIXED EQUIPMENT, MARKER BOARDS, WINDOW COVERINGS, SPECIALTIES, UTILITIES & MISC. ITEMS IN AREAS OF WORK AS NEEDED TO COMPLETE NEW CONSTRUCTION.
7. DEMO ALL EXISTING MECHANICAL EQUIPMENT AND DUCTWORK THROUGHOUT BUILDING, EXCEPT AS NOTED, SEE MEP.
8. AT ROOF, REMOVE ALL EXISTING MECHANICAL EQUIPMENT, DUCTWORK, CONDUITS, ETC. AND DEMO EXISTING ROOFING. REMOVE EXISTING ROOF DRAINS, PIPING AND OTHER ITEMS NOT NEEDED FOR NEW CONSTRUCTION. REMOVE ROOF WELL WALL CLADDING AND OTHER ELEMENTS NEEDED TO INSTALL NEW CLADDING. REMOVE, RETAIN AND REINSTALL ALL ITEMS AS NEEDED TO INSTALL A NEW ROOF. SEE MEP DRAWINGS.
9. DEMO ALL EXISTING CASEWORK IN AREAS OF WORK UNLESS SHOWN TO REMAIN
10. REMOVE EXISTING FLOOR FINISHES AND PATCH EXISTING SUBSTRATES AS REQUIRED TO INSTALL NEW FLOOR FINISHES, COMPLY WITH FLOOR MANUFACTURER'S RECOMMENDATIONS. INSTALL HYDRAULIC CEMENT UNDERLAYMENT AS REQUIRED. REFER ROOM FINISH SCHEDULE FOR AREAS WITH NEW FLOOR FINISH (A701)

LEGEND

- EXISTING WALLS
- WALLS TO BE DEMOLISHED
- EXISTING WIRE PARTITIONS TO BE DEMOLISHED
- EXISTING DOORS
- DOORS TO BE DEMOLISHED

KEY NOTES

(1) REMOVE GYP, CHAIR RAIL AND WALL FINISHES DOWN TO STUDS FOR INSTALLATION OF NEW SHEAR WALL SHEATHING AND HOLD-DOWNS, SEE STRUC

(2) PREP FLOOR FOR REPAIR. PATCH & REPAIR ANY HOLES IN EXPOSED SLAB RESULTING FROM DEMO, TYP.

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WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
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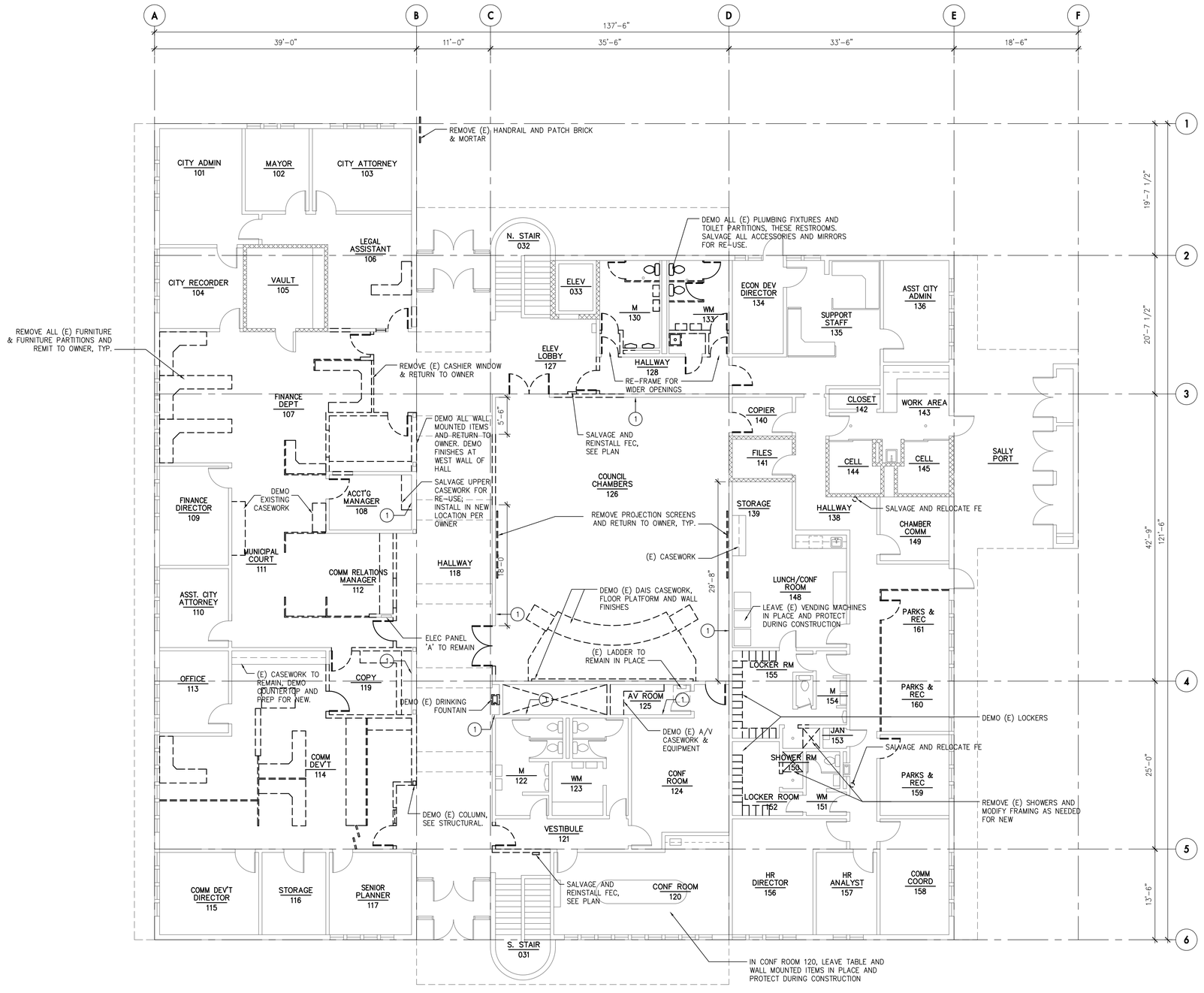
Issue	Revision	Date
100% CD		12/14/18

DEMOLITION FLOOR PLAN - BASEMENT

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A010



1 DEMOLITION FLOOR PLAN - GROUND LEVEL

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

NOTES THIS SHEET

1. REMOVE ALL EXISTING FLOOR, CEILING AND WALL FINISHES AS REQUIRED TO PREPARE FOR INSTALLATION OF NEW CONSTRUCTION
2. REMOVE ALL EXISTING WALL OUTLETS, SWITCHES, LIGHTING & HVAC CONTROLS IN AREAS OF NEW CONSTRUCTION
3. ALL DEMOLITION CUTS ARE TO BE CLEAN & STRAIGHT. NO OVER CUTTING AT CORNERS.
4. ALL PAINTED SURFACES IN AREAS OF NEW CONSTRUCTION TO BE PREPPED TO RECEIVE NEW PAINT.
5. OWNER WILL REMOVE ALL EXISTING FURNITURE & EQUIPMENT NOT FIXED IN PLACE
6. CONTRACTOR RESPONSIBLE FOR REMOVING & REINSTALLING ALL EXISTING FIXED EQUIPMENT, MARKER BOARDS, WINDOW COVERINGS, SPECIALTIES, UTILITIES & MISC. ITEMS IN AREAS OF WORK AS NEEDED TO COMPLETE NEW CONSTRUCTION.
7. DEMO ALL EXISTING MECHANICAL EQUIPMENT AND DUCTWORK THROUGHOUT BUILDING, EXCEPT AS NOTED, SEE MEP.
8. AT ROOF, REMOVE ALL EXISTING MECHANICAL EQUIPMENT, DUCTWORK, CONDUITS, ETC. AND DEMO EXISTING ROOFING. REMOVE EXISTING ROOF DRAINS, PIPING AND OTHER ITEMS NOT NEEDED FOR NEW CONSTRUCTION. REMOVE ROOF WELL WALL CLADDING AND OTHER ELEMENTS NEEDED TO INSTALL NEW CLADDING. REMOVE, RETAIN AND REINSTALL ALL ITEMS AS NEEDED TO INSTALL A NEW ROOF. SEE MEP DRAWINGS.
9. DEMO ALL EXISTING CASEWORK IN AREAS OF WORK UNLESS SHOWN TO REMAIN
10. REMOVE EXISTING FLOOR FINISHES AND PATCH EXISTING SUBSTRATES AS REQUIRED TO INSTALL NEW FLOOR FINISHES, COMPLY WITH FLOOR MANUFACTURER'S RECOMMENDATIONS. INSTALL HYDRAULIC CEMENT UNDERLAYMENT AS REQUIRED. REFER ROOM FINISH SCHEDULE FOR AREAS WITH NEW FLOOR FINISH (A701)

LEGEND

- EXISTING WALLS
- WALLS TO BE DEMOLISHED
- EXISTING WIRE PARTITIONS TO BE DEMOLISHED
- EXISTING DOORS
- DOORS TO BE DEMOLISHED

KEY NOTES

1. REMOVE GYP, CHAIR RAIL AND WALL FINISHES DOWN TO STUDS FOR INSTALLATION OF NEW SHEAR WALL SHEATHING AND HOLD-DOWNS, SEE STRUC
2. PREP FLOOR FOR REPAIR. PATCH & REPAIR ANY HOLES IN EXPOSED SLAB RESULTING FROM DEMO, TYP.

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WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
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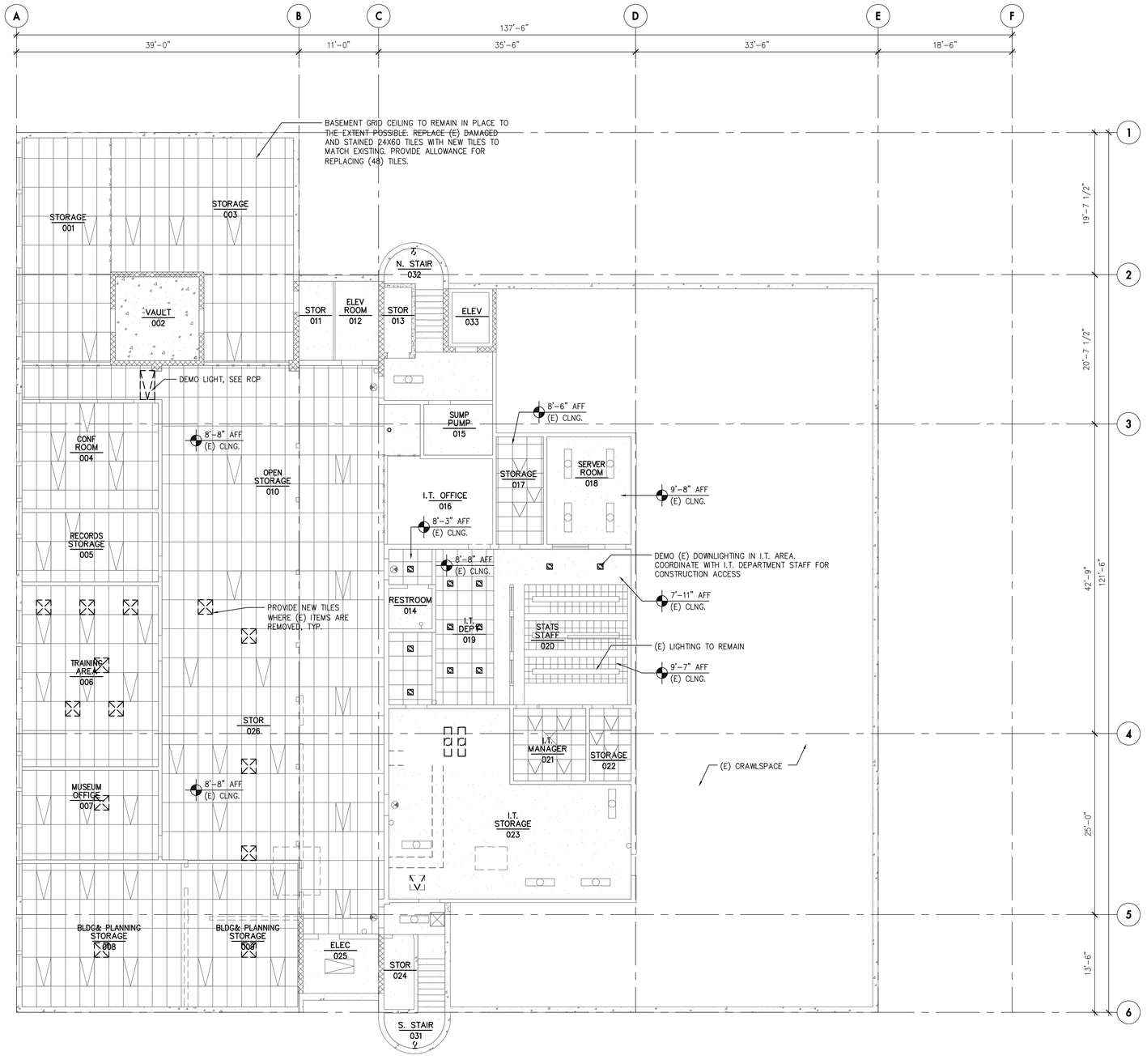
Issue	Revision	Date
100% CD		12/14/18

DEMOLITION FLOOR PLAN - GROUND LEVEL

Scale DEMOLITION FLOOR
Date DECEMBER 14, 2018
Sheet No. A011



1 DEMOLITION REFLECTED CEILING PLAN - BASEMENT

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

NOTES THIS SHEET

1. REMOVE ALL EXISTING FLOOR, CEILING AND WALL FINISHES AS REQUIRED TO PREPARE FOR INSTALLATION OF NEW CONSTRUCTION
2. REMOVE ALL EXISTING WALL OUTLETS, SWITCHES, LIGHTING & HVAC CONTROLS IN AREAS OF NEW CONSTRUCTION
3. ALL DEMOLITION CUTS ARE TO BE CLEAN & STRAIGHT. NO OVER CUTTING AT CORNERS.
4. ALL PAINTED SURFACES IN AREAS OF NEW CONSTRUCTION TO BE PREPPED TO RECEIVE NEW PAINT.
5. OWNER WILL REMOVE ALL EXISTING FURNITURE & EQUIPMENT NOT FIXED IN PLACE
6. CONTRACTOR RESPONSIBLE FOR REMOVING & REINSTALLING ALL EXISTING FIXED EQUIPMENT, MARKER BOARDS, WINDOW COVERINGS, SPECIALTIES, UTILITIES & MISC. ITEMS IN AREAS OF WORK AS NEEDED TO COMPLETE NEW CONSTRUCTION.
7. DEMO ALL EXISTING MECHANICAL EQUIPMENT AND DUCTWORK THROUGHOUT BUILDING, EXCEPT AS NOTED, SEE MEP.
8. AT ROOF, REMOVE ALL EXISTING MECHANICAL EQUIPMENT, DUCTWORK, CONDUITS, ETC. AND DEMO EXISTING ROOFING. REMOVE EXISTING ROOF DRAINS, PIPING AND OTHER ITEMS NOT NEEDED FOR NEW CONSTRUCTION. REMOVE ROOF WELL WALL CLADDING AND OTHER ELEMENTS NEEDED TO INSTALL NEW CLADDING. REMOVE, RETAIN AND REINSTALL ALL ITEMS AS NEEDED TO INSTALL A NEW ROOF. SEE MEP DRAWINGS.
9. DEMO ALL LIGHTING AS SHOWN. ANY EXISTING LIGHTING NOT SHOWN, CONFIRM WITH OWNER.
10. DEMO ALL EXISTING CASEWORK IN AREAS OF WORK UNLESS SHOWN TO REMAIN
11. REMOVE EXISTING FLOOR FINISHES AND PATCH EXISTING SUBSTRATES AS REQUIRED TO INSTALL NEW FLOOR FINISHES, COMPLY WITH FLOOR MANUFACTURER'S RECOMMENDATIONS. INSTALL HYDRAULIC CEMENT UNDERLAYMENT AS REQUIRED.

LEGEND

- EXISTING ACOUSTIC CEILING TILE TO REMAIN
- EXISTING PLASTER OR GYP BOARD CEILING
- EXISTING CONCRETE SLAB CEILING
- EXISTING WOOD SLAT CEILING TO BE DEMOLISHED
- EXISTING SURFACE MOUNT LINEAR LIGHTING
- SURFACE MOUNT LINEAR LIGHTING TO BE DEMOLISHED
- EXISTING PENDANT MOUNT LINEAR LIGHTING
- 2x2 / 2X4 RECESSED TROFFER LIGHTING TO BE DEMOLISHED
- SUPPLY AIR GRILL, SEE MECH. TO BE DEMOLISHED
- RETURN AIR GRILL, SEE MECH. TO BE DEMOLISHED
- EXISTING RECESSED DOWNLIGHT
- RECESSED DOWNLIGHT TO BE DEMOLISHED
- EXISTING PENDANT LIGHTING
- EXISTING WALL SCONCE LIGHTING
- WALL SCONCE LIGHTING TO BE DEMOLISHED
- LINEAR FIXTURE TO BE DEMOLISHED
- SPOT LIGHTS TO BE DEMOLISHED
- EXISTING EXIT SIGN TO REMAIN

KEY NOTES

1. REMOVE GYP AND WALL FINISHES DOWN TO STUDS FOR INSTALLATION OF NEW SHEAR WALL SHEATHING AND HOLD-DOWNS, SEE STRUC
2. PREP FLOOR FOR REPAIR. PATCH & REPAIR ANY HOLES IN EXPOSED SLAB RESULTING FROM DEMO, TYP.

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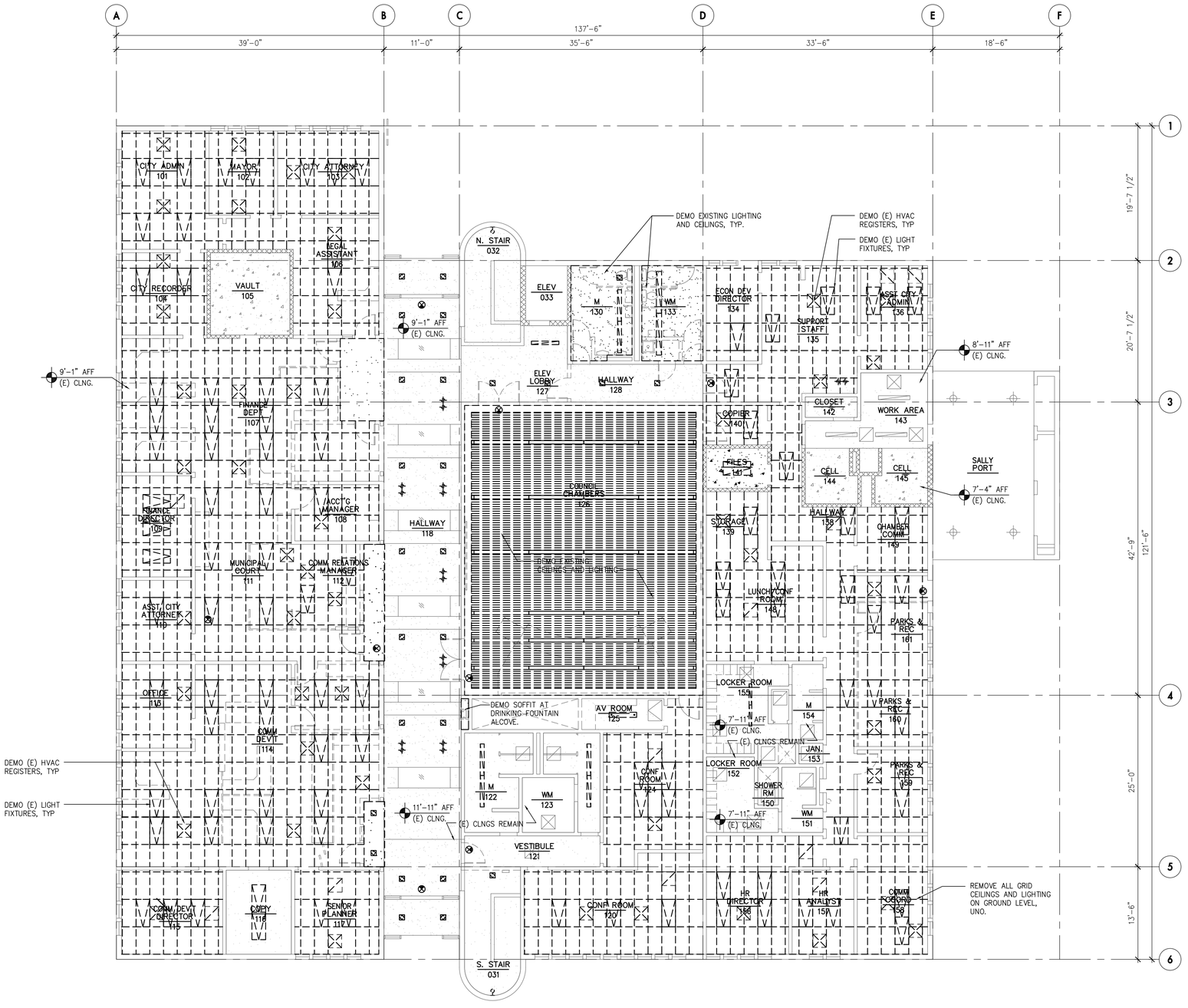
Issue	Revision	Date
100% CD		12/14/18

DEMO REFLECTED CLNG PLAN - BASEMENT

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A020



1 DEMOLITION REFLECTED CEILING PLAN - GROUND LEVEL

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

NOTES THIS SHEET

1. REMOVE ALL EXISTING FLOOR, CEILING AND WALL FINISHES AS REQUIRED TO PREPARE FOR INSTALLATION OF NEW CONSTRUCTION
2. REMOVE ALL EXISTING WALL OUTLETS, SWITCHES, LIGHTING & HVAC CONTROLS IN AREAS OF NEW CONSTRUCTION
3. ALL DEMOLITION CUTS ARE TO BE CLEAN & STRAIGHT. NO OVER CUTTING AT CORNERS.
4. ALL PAINTED SURFACES IN AREAS OF NEW CONSTRUCTION TO BE PREPPED TO RECEIVE NEW PAINT.
5. OWNER WILL REMOVE ALL EXISTING FURNITURE & EQUIPMENT NOT FIXED IN PLACE
6. CONTRACTOR RESPONSIBLE FOR REMOVING & REINSTALLING ALL EXISTING FIXED EQUIPMENT, MARKER BOARDS, WINDOW COVERINGS, SPECIALTIES, UTILITIES & MISC. ITEMS IN AREAS OF WORK AS NEEDED TO COMPLETE NEW CONSTRUCTION.
7. DEMO ALL EXISTING MECHANICAL EQUIPMENT AND DUCTWORK THROUGHOUT BUILDING, EXCEPT AS NOTED, SEE MEP.
8. AT ROOF, REMOVE ALL EXISTING MECHANICAL EQUIPMENT, DUCTWORK, CONDUITS, ETC. AND DEMO EXISTING ROOFING. REMOVE EXISTING ROOF DRAINS, PIPING AND OTHER ITEMS NOT NEEDED FOR NEW CONSTRUCTION. REMOVE ROOF WELL WALL CLADDING AND OTHER ELEMENTS NEEDED TO INSTALL NEW CLADDING. REMOVE, RETAIN AND REINSTALL ALL ITEMS AS NEEDED TO INSTALL A NEW ROOF. SEE MEP DRAWINGS.
9. DEMO ALL LIGHTING AS SHOWN. ANY EXISTING LIGHTING NOT SHOWN, CONFIRM WITH OWNER.
10. DEMO ALL EXISTING CASEWORK IN AREAS OF WORK UNLESS SHOWN TO REMAIN
11. REMOVE EXISTING FLOOR FINISHES AND PATCH EXISTING SUBSTRATES AS REQUIRED TO INSTALL NEW FLOOR FINISHES, COMPLY WITH FLOOR MANUFACTURER'S RECOMMENDATIONS. INSTALL HYDRAULIC CEMENT UNDERLAYMENT AS REQUIRED.

LEGEND

- EXISTING ACOUSTIC CEILING TILE TO REMAIN
- EXISTING PLASTER OR GYP BOARD CEILING
- EXISTING CONCRETE SLAB CEILING
- EXISTING WOOD SLAT CEILING TO BE DEMOLISHED
- EXISTING SURFACE MOUNT LINEAR LIGHTING
- SURFACE MOUNT LINEAR LIGHTING TO BE DEMOLISHED
- EXISTING PENDANT MOUNT LINEAR LIGHTING
- 2x2 / 2X4 RECESSED TROFFER LIGHTING TO BE DEMOLISHED
- SUPPLY AIR GRILL, SEE MECH. TO BE DEMOLISHED
- RETURN AIR GRILL, SEE MECH. TO BE DEMOLISHED
- EXISTING RECESSED DOWNLIGHT
- RECESSED DOWNLIGHT TO BE DEMOLISHED
- EXISTING PENDANT LIGHTING
- EXISTING WALL SCONCE LIGHTING
- WALL SCONCE LIGHTING TO BE DEMOLISHED
- LINEAR FIXTURE TO BE DEMOLISHED
- SPOT LIGHTS TO BE DEMOLISHED
- EXISTING EXIT SIGN TO REMAIN

KEY NOTES

1. REMOVE GYP AND WALL FINISHES DOWN TO STUDS FOR INSTALLATION OF NEW SHEAR WALL SHEATHING AND HOLD-DOWNS, SEE STRUC
2. PREP FLOOR FOR REPAIR. PATCH & REPAIR ANY HOLES IN EXPOSED SLAB RESULTING FROM DEMO, TYP.

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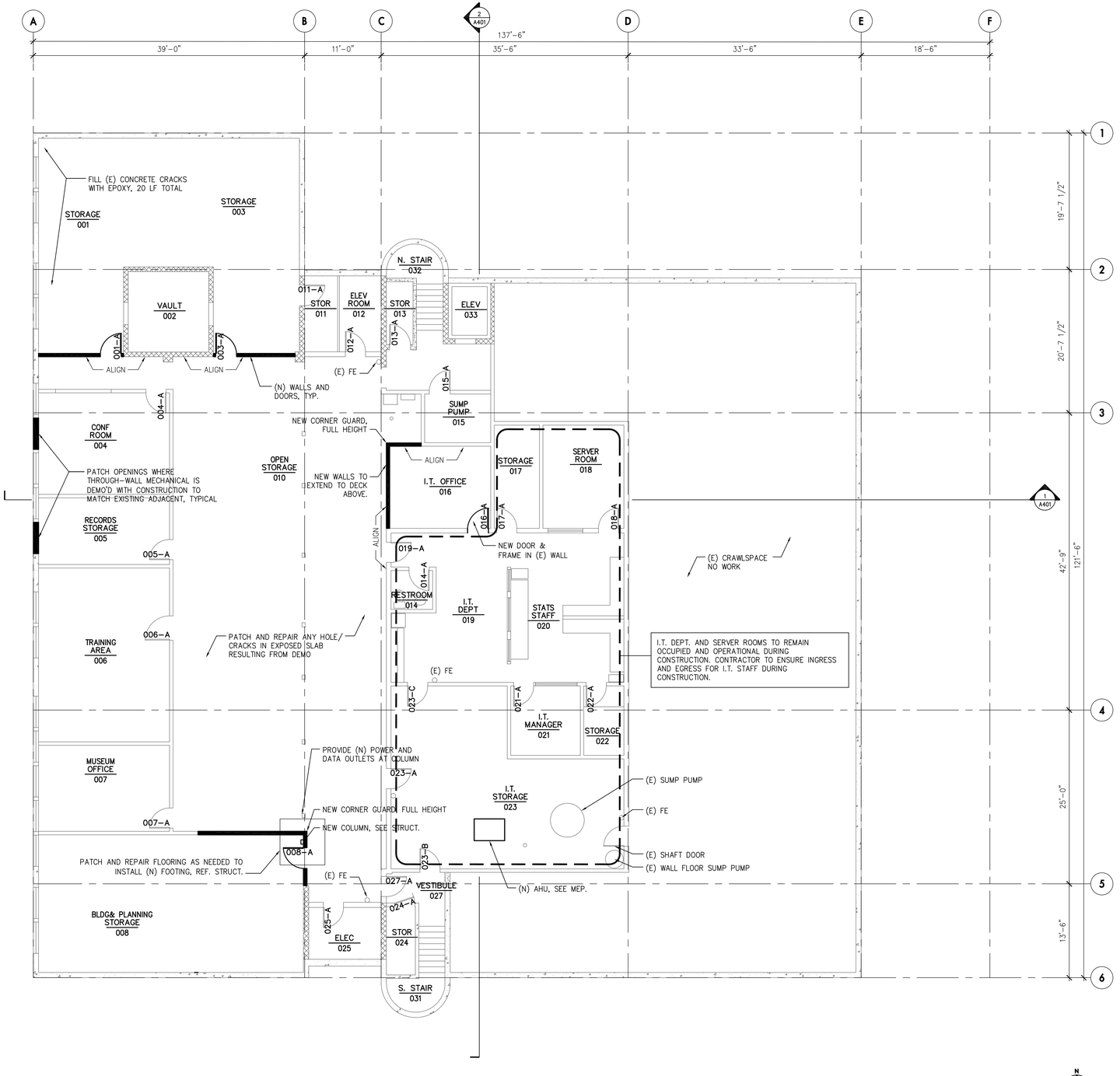
100% CD		12/14/18

DEMO REFLECTED CLNG PLAN - GROUND LEVEL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A021



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

NOTES THIS SHEET

1. ALL NEW WALLS TO BE WALL ASSEMBLY 1, UNO.
2. ALL NEW WALLS TO EXTEND TO DECK ABOVE. PACK VOIDS BETWEEN T.O. WALL AND ROOF DECK WITH ACOUSTICAL INSULATION, SEE DETAIL 20/A601
3. WHERE NEW WALLS ALIGN WITH OR INFILL EXISTING WALLS, PROVIDE APPROPRIATE SIZE FRAMING AND/OR ADDITIONAL GYP LAYERS AS NEEDED FOR FINISH SURFACES TO ALIGN
4. ALL DIMENSIONS TO F.O. FINISH OR CENTERLINE OF FRAMING, UNO
5. NEW WOOD FRAMING AND BLOCKING IN CONTACT WITH CONCRETE TO BE PRESSURE-TREATED
6. PROVIDE 2x SOLID BLOCKING AT ALL WALL MOUNTED ITEMS
7. ATTIC AREAS ARE SUBDIVIDED BY EXISTING SINGLE LAYER GYP BOARD DRAFTSTOPS WHICH HAVE BEEN COMPROMISED OVER TIME WITH ACCESS HOLES AND UNSEALED PENETRATIONS. PROVIDE ALLOWANCE FOR SEALING DRAFTSTOP OPENINGS WITH 1/2" GYP. BOARD AS CALLED FOR IN SPECIFICATIONS.
8. REFERENCE FURNITURE PLANS FOR OFOI FURNITURE LAYOUT

LEGEND

- EXISTING WALLS
- NEW WALLS

KEY NOTES

1. PROVIDE NEW ST-1 COUNTERTOP ON EXISTING COUNTER WITH 4" SIDE AND BACK SPLASHES. COUNTER THICKNESS, EDGE DETAIL, ETC, TO MATCH THAT OF NEW SOLID SURFACE COUNTERS.
2. REMOVE, ADD BACK, PATCH AND REPAIR WALL FRAMING AND FINISHES AS NEEDED TO INSTALL NEW SHOWERS, PATCH AND REPAIR ADJ. FINISHES AS NEEDED.
3. AT COUNCIL CHAMBERS, REMOVE (E) WALL FINISH LAYERS AND INSTALL LAYER OF PLYWOOD OVER STUDS PER STRUC. INSTALL (1) LAYER 5/8" TYPE X GYP OVER PLYWOOD TO PROVIDE NEW FINISH SURFACE.
4. NEW DOOR IN EXISTING BRICK VENEER WALL. PATCH, REPAIR AND RE-SUPPORT BRICK AS REQUIRED TO INSTALL NEW OPENING.
5. INSTALL NEW PLYWOOD AND HOLD DOWNS AT WALL, SEE STRUC
6. INSTALL NEW GYP BOARD AT EXISTING WALL FRAMING IN FORMER SHAFT AREA, AS NEEDED
7. EXTEND EXISTING WALLS TO STRUCTURE ABOVE, AS INDICATED BY DASHED LINE, SEE DETAIL 20/A601. INSTALL ACOUSTIC SEALANT AT BASE OF WALL.

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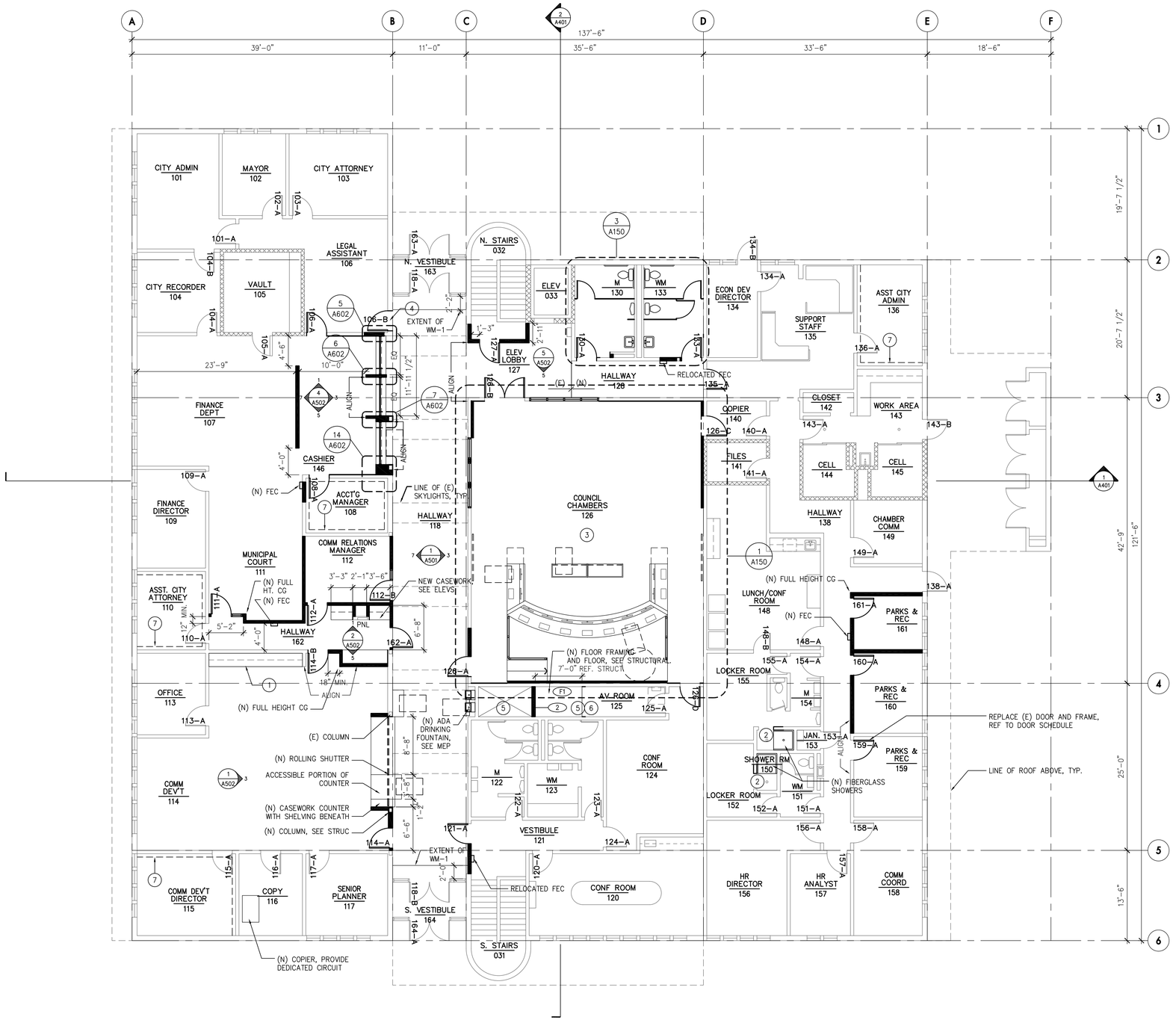
Issue	Revision	Date
100% CD		12/14/18

FLOOR PLAN - BASEMENT

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A100



1 FLOOR PLAN - GROUND LEVEL

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

NOTES THIS SHEET

1. ALL NEW WALLS TO BE WALL ASSEMBLY 1, UNO.
2. ALL NEW WALLS TO EXTEND TO DECK ABOVE. PACK VOIDS BETWEEN T.O. WALL AND ROOF DECK WITH ACOUSTICAL INSULATION, SEE DETAIL 20/A601
3. WHERE NEW WALLS ALIGN WITH OR INFILL EXISTING WALLS, PROVIDE APPROPRIATE SIZE FRAMING AND/OR ADDITIONAL GYP LAYERS AS NEEDED FOR FINISH SURFACES TO ALIGN
4. ALL DIMENSIONS TO F.O. FINISH OR CENTERLINE OF FRAMING, UNO
5. NEW WOOD FRAMING AND BLOCKING IN CONTACT WITH CONCRETE TO BE PRESSURE-TREATED
6. PROVIDE 2x SOLID BLOCKING AT ALL WALL MOUNTED ITEMS
7. ATTIC AREAS ARE SUBDIVIDED BY EXISTING SINGLE LAYER GYP BOARD DRAFTSTOPS WHICH HAVE BEEN COMPROMISED OVER TIME WITH ACCESS HOLES AND UNSEALED PENETRATIONS. PROVIDE ALLOWANCE FOR SEALING DRAFTSTOP OPENINGS WITH 1/2" GYP. BOARD AS CALLED FOR IN SPECIFICATIONS.
8. REFERENCE FURNITURE PLANS FOR OFOI FURNITURE LAYOUT

LEGEND

- EXISTING WALLS
- NEW WALLS

KEY NOTES

1. PROVIDE NEW ST-1 COUNTERTOP ON EXISTING COUNTER WITH 4" SIDE AND BACK SPLASHES. COUNTER THICKNESS, EDGE DETAIL, ETC, TO MATCH THAT OF NEW SOLID SURFACE COUNTERS.
2. REMOVE, ADD BACK, PATCH AND REPAIR WALL FRAMING AND FINISHES AS NEEDED TO INSTALL NEW SHOWERS, PATCH AND REPAIR ADJ. FINISHES AS NEEDED.
3. AT COUNCIL CHAMBERS, REMOVE (E) WALL FINISH LAYERS AND INSTALL LAYER OF PLYWOOD OVER STUDS PER STRUC. INSTALL (1) LAYER 5/8" TYPE X GYP OVER PLYWOOD TO PROVIDE NEW FINISH SURFACE.
4. NEW DOOR IN EXISTING BRICK VENEER WALL. PATCH, REPAIR AND RE-SUPPORT BRICK AS REQUIRED TO INSTALL NEW OPENING.
5. INSTALL NEW PLYWOOD AND HOLD DOWNS AT WALL, SEE STRUC
6. INSTALL NEW GYP BOARD AT EXISTING WALL FRAMING IN FORMER SHAFT AREA, AS NEEDED
7. EXTEND EXISTING WALLS TO STRUCTURE ABOVE, AS INDICATED BY DASHED LINE, SEE DETAIL 20/A601. INSTALL ACOUSTIC SEALANT AT BASE OF WALL.

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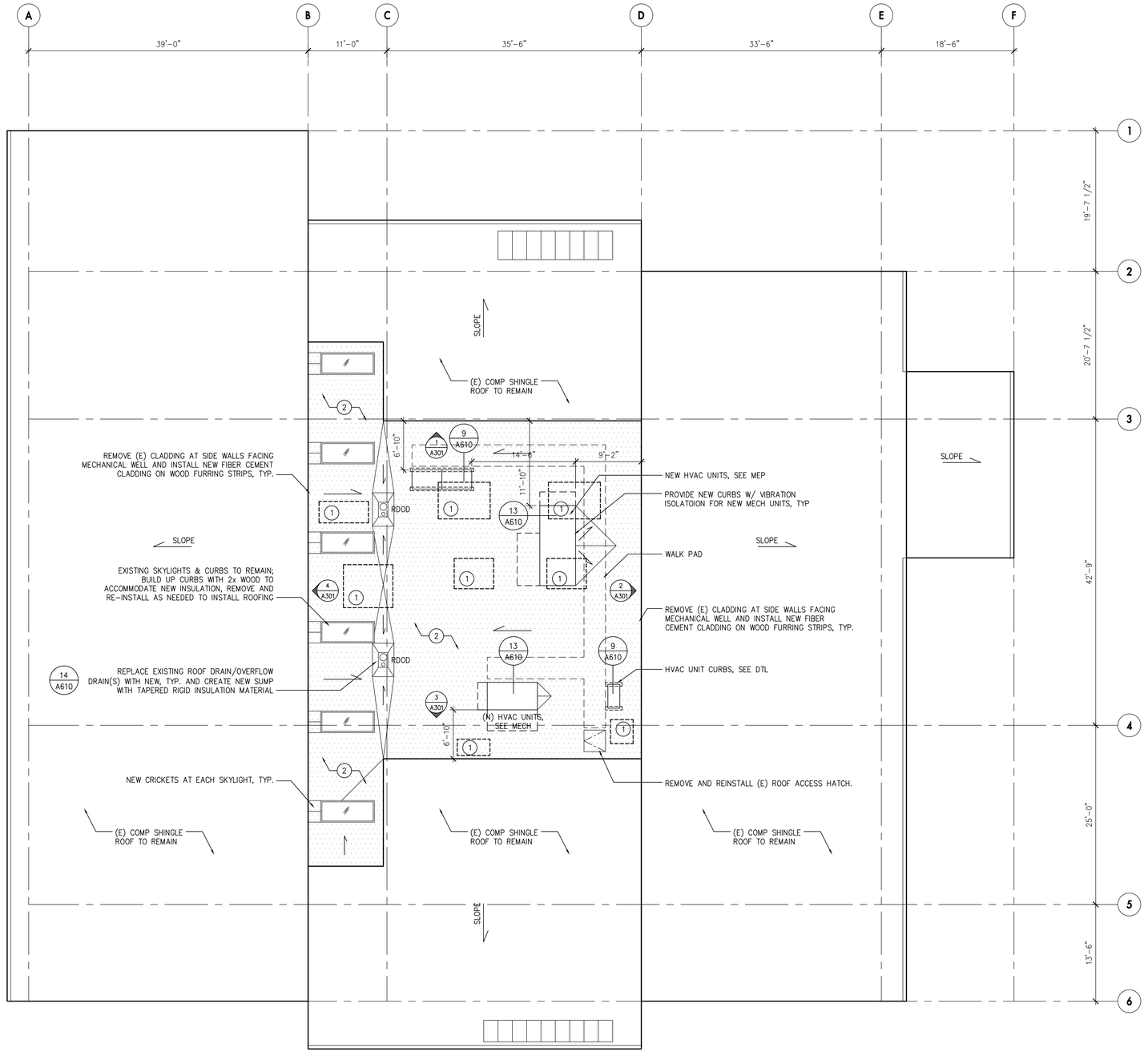
100% CD		12/14/18

FLOOR PLAN - GROUND LEVEL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A101



1 ROOF PLAN

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

NOTES THIS SHEET

1. CONTRACTOR TO TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGING EXISTING ROOFING AND FLASHINGS TO REMAIN, AND SHALL REPAIR ANY DAMAGE CAUSED BY CONSTRUCTION ACTIVITIES
2. PATCH AND REPAIR HOLES LEFT BY REMOVAL OF EXISTING MEP ITEMS WITH MATERIALS TO MATCH ADJACENT EXISTING CONSTRUCTION
3. PAINT ALL ROOF VENTS, PIPES AND TERMINATIONS TO MATCH ADJACENT ROOF SURFACE
4. MAINTAIN ALL EXISTING PLUMBING VENTS AND OTHER PENETRATIONS REQUIRED FOR BUILDING SYSTEMS
5. EXISTING COMPOSITION SHINGLE ROOFING TO REMAIN; PATCH AND REPAIR WHERE REQUIRED TO COMPLETE SCOPE OF WORK
6. REMOVE AND REINSTALL RACEWAYS, BOXES AND OTHER ITEMS AS NEEDED TO INSTALL NEW CLADDING
7. PROVIDE NEW TAPERED INSULATION CRICKETS AT ALL NEW HVAC UNIT CURBS, TYP.
8. INSTALL ALL ROOFING MEMBRANE PENETRATIONS PER MANUFACTURER'S RECOMMENDATIONS

KEY NOTES

(1) INFILL ROOF DECK PENETRATION FROM DEMOLISHING EXISTING MEP, REFERENCE STRUC.

(2) INSTALL NEW SINGLE PLY ROOFING AND TAPERED R-11 RIGID INSULATION THROUGHOUT FLAT ROOF AREA (INDICATED BY HATCH) INCLUDING NEW FLASHINGS, TIE-INS, ETC. ACHIEVE MINIMUM 0.25:12 SLOPE IN ALL AREAS AND MORE IF POSSIBLE. INTENT IS TO INCREASE ROOF SLOPE TO THE EXTENT POSSIBLE TO ENSURE POSITIVE DRAINAGE. BUILD UP ANY EXISTING CURBS AS REQUIRED BY ADDITIONAL INSULATION THICKNESS.

REPLACE ANY DETERIORATED SHEATHING FOUND, INCLUDING REPLACEMENT OF EXISTING INSULATION. ASSUME 128 sf OF SHEATHING REPLACEMENT IN BASE BID.

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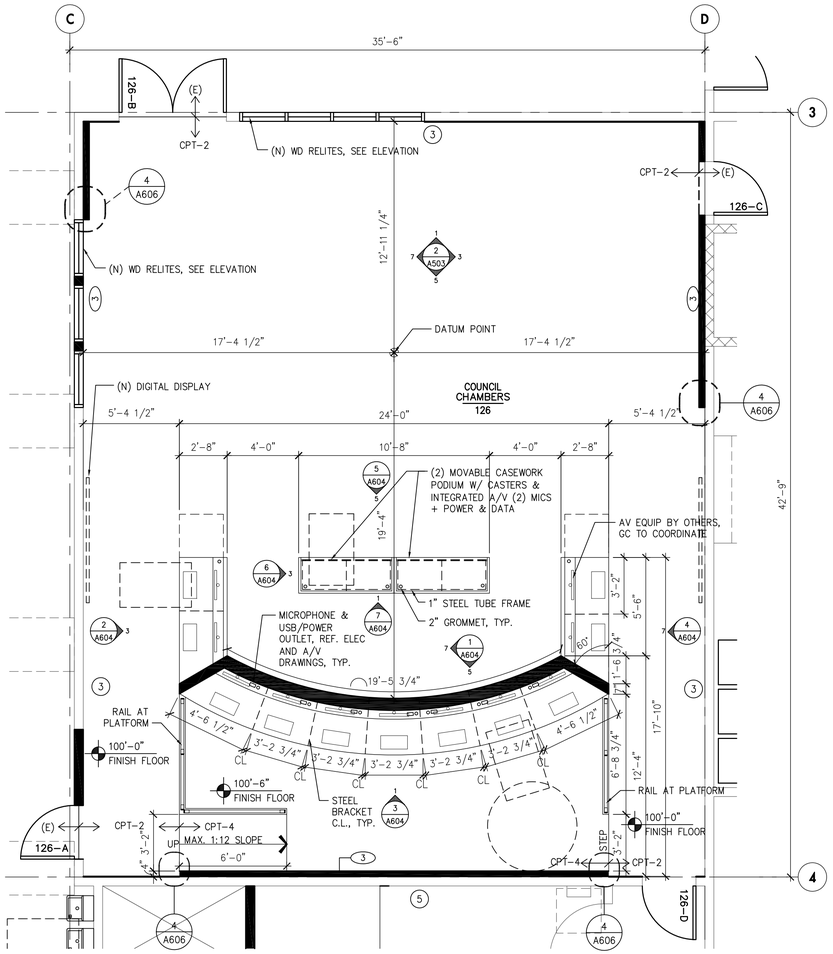
Issue	Revision	Date
100% CD		12/14/18

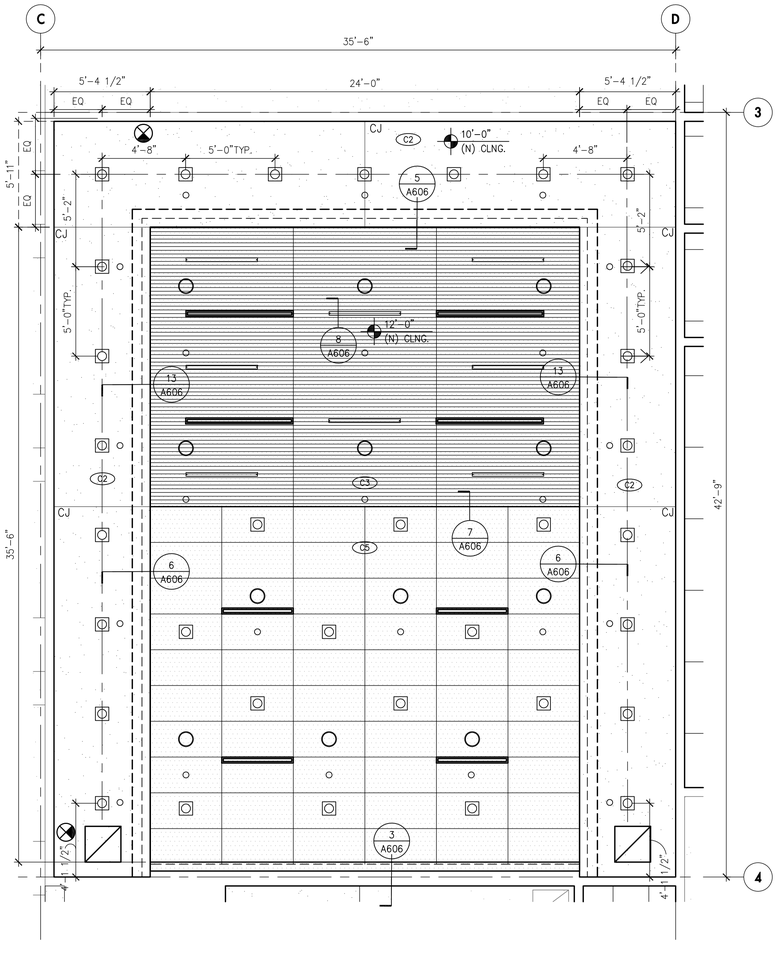
ROOF PLAN

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A102



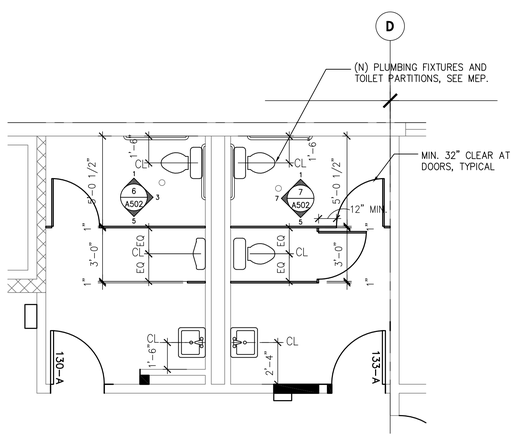
1 COUNCIL CHAMBERS 126 - ENLARGED FLOOR PLAN

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



2 COUNCIL CHAMBERS 126 - ENLARGED REFLECTED CEILING PLAN

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



3 ENLARGED PLAN - RESTROOMS M130 & WM133

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

NOTES THIS SHEET

1. ALL NEW WALLS TO BE WALL ASSEMBLY 1, UNO.
2. ALL NEW WALLS TO EXTEND TO DECK ABOVE. PACK VOIDS BETWEEN T.O. WALL AND ROOF DECK WITH ACOUSTICAL INSULATION, SEE DETAIL 20/A601
3. WHERE NEW WALLS ALIGN WITH OR INFILL EXISTING WALLS, PROVIDE APPROPRIATE SIZE FRAMING AND/OR ADDITIONAL GYP LAYERS AS NEEDED FOR FINISH SURFACES TO ALIGN
4. ALL DIMENSIONS TO F.O. FINISH OR CENTERLINE OF FRAMING, UNO
5. NEW WOOD FRAMING AND BLOCKING IN CONTACT WITH CONCRETE TO BE PRESSURE-TREATED
6. PROVIDE 2x SOLID BLOCKING AT ALL WALL MOUNTED ITEMS
7. ATTIC AREAS ARE SUBDIVIDED BY EXISTING SINGLE LAYER GYP BOARD DRAFTSTOPS WHICH HAVE BEEN COMPROMISED OVER TIME WITH ACCESS HOLES AND UNSEALED PENETRATIONS. PROVIDE ALLOWANCE FOR SEALING DRAFTSTOP OPENINGS WITH 1/2" GYP. BOARD AS CALLED FOR IN SPECIFICATIONS.
8. REFER TO REFLECTED CEILING PLAN FOR LAYOUT OF WOOD PANEL CEILING, WCP-2.
9. ~~REFER TO PLANS FOR FURNITURE AND EQUIPMENT LAYOUT.~~

LEGEND

- EXISTING WALLS
- NEW WALLS

LEGEND

- EXISTING WALLS
- NEW WALLS
- WOOD GRILL CEILING, WCP-3
- WOOD PANEL CEILING, WCP-2
- LINEAR DIFFUSERS, SEE MECH
- HVAC RETURN/EXHAUST, SEE MECH
- RECESSED DOWNLIGHT
- 2" X 4' LINEAR LIGHT FIXTURE, REF. ELEC.
- RECESSED COVE LIGHTING
- SPEAKERS, REF. A/V
- COVERED SPRINKLERS, REF. PLUMBING

KEY NOTES

1. PROVIDE NEW ST-1 COUNTERTOP ON EXISTING COUNTER WITH 4" SIDE AND BACK SPLASHES. COUNTER THICKNESS, EDGE DETAIL, ETC, TO MATCH THAT OF NEW SOLID SURFACE COUNTERS.
2. REMOVE, ADD BACK, PATCH AND REPAIR WALL FRAMING AND FINISHES AS NEEDED TO INSTALL NEW SHOWERS, PATCH AND REPAIR ADJ. FINISHES AS NEEDED.
3. AT COUNCIL CHAMBERS, REMOVE (E) WALL FINISH LAYERS AND INSTALL LAYER OF PLYWOOD OVER STUDS PER STRUC. INSTALL (1) LAYER 5/8" TYPE X GYP OVER PLYWOOD TO PROVIDE NEW FINISH SURFACE.
4. NEW DOOR IN EXISTING BRICK VENEER WALL. PATCH, REPAIR AND RE-SUPPORT BRICK AS REQUIRED TO INSTALL NEW OPENING.
5. INSTALL NEW PLYWOOD AND HOLD DOWNS AT WALL, SEE STRUC
6. INSTALL NEW GYP BOARD AT EXISTING WALL FRAMING IN FORMER SHAFT AREA, AS NEEDED
7. EXTEND EXISTING WALLS TO STRUCTURE ABOVE, AS INDICATED BY DASHED LINE, SEE DETAIL 20/A601. INSTALL ACOUSTIC SEALANT AT BASE OF WALL.

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REGISTERED ARCHITECT
2919
DAVID T. HYMAN
PORTLAND, OREGON
STATE OF OREGON

WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

ENLARGED PLAN & ELEVATIONS - COUNCIL CHAMBERS

Scale 1/8" = 1'-0"

Date DECEMBER 14, 2018

Sheet No. A150

1 REFLECTED CEILING PLAN - BASEMENT
SCALE: 1/8" = 1'-0"

NOTES THIS SHEET

1. INSTALL NEW CEILINGS THROUGHOUT GROUND LEVEL AS SHOWN; CEILINGS TO BE TYPE C1, UNO
2. MODIFY SPRINKLER SYSTEM AS NEEDED FOR NEW CEILINGS AND LIGHTING
3. CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITIONS AND ALERT ARCHITECT AND OWNER TO ANY DISCREPANCIES FOUND
4. COORDINATE LOCATION OF ALL CEILING ITEMS NOT SHOWN WITH ARCHITECT
5. NEW ACOUSTICAL CEILINGS TO BE LOCATED SLIGHTLY LOWER THAN EXISTING WALL HEADS, BUT AS HIGH AS POSSIBLE, UNO. EXISTING AND NEW WALLS WILL INTERRUPT ALL NEW CEILING GRIDS TO ENHANCE ACOUSTICAL SEPARATION. RE-BRACE WALL HEADS TO ROOF STRUCTURE AS NEEDED.
6. PATCH AND REPAIR CEILING FINISHES AS NEEDED TO MATCH ADJACENT EXISTING WHERE EXISTING ITEMS ARE DEMOLISHED, MOVED OR ALTERED.
7. CENTER ALL CEILING ITEMS IN TILE MODULE, OR SYMMETRICAL IN ROOM OR SOFFIT, UNO.
8. HEIGHTS OF EXISTING ELEMENTS ARE APPROXIMATE, FIELD VERIFY.
9. NEW WINDOW COVERINGS TO BE OFOI, UNO. CONTRACTOR TO COORDINATE ACCESS WITH OWNER'S WINDOW COVERING INSTALLER.
10. BASEMENT EXIT SIGNS TO REMAIN AS-IS

LEGEND

- ACOUSTIC CEILING TILE
- PLASTER OR GYP BOARD CEILING
- CONCRETE SLAB CEILING
- WOOD GRILL CEILING, WCP-3
- WOOD PANEL CEILING, WCP-2
- SURFACE MOUNT LINEAR LIGHTING
- PENDANT MOUNT LINEAR LIGHTING
- 2x2 / 2X4 RECESSED TROFFER LIGHTING
- HVAC CASETTE, SEE MECH
- LINEAR DIFFUSERS, SEE MECH
- HVAC SUPPLY, SEE MECH
- HVAC RETURN/EXHAUST, SEE MECH
- RECESSED DOWNLIGHT
- SURFACE MOUNT LIGHTING
- WALL SCONCE LIGHTING
- STRIP LIGHTING
- RECESSED COVE LIGHTING
- SPEAKERS, REF. A/V
- COVERED SPRINKLERS, REF. PLUMBING
- 2" X 4' LINEAR LIGHT FIXTURE, REF. ELEC.

KEY NOTES

1. INSTALL NEW FLOOR ASSEMBLY TO CONVERT PART OF EXISTING SHAFT INTO STORAGE ROOM AT GROUND LEVEL, SEE PLANS
2. INSTALL NEW FIRE RATED CEILING ASSEMBLY TO ENCLOSE BOTTOM OF SHAFT; FIRESTOP ALL PENETRATING ITEMS IN ACCORDANCE WITH CODE
3. SELECTED (E) HVAC ELEMENTS TO REMAIN, SEE MEP
4. EXTEND EXISTING PERIMETER WALLS TO STRUCTURE ABOVE, AS INDICATED BY DASHED LINE, SEE DETAIL 20/A601. ALSO INSTALL ACOUSTIC SEALANT AT BASE OF WALL.
5. DEMOLISH EXISTING SOFFIT AND RE-FRAME AT HIGHER ELEVATION, NEW CEILING TYPE C2

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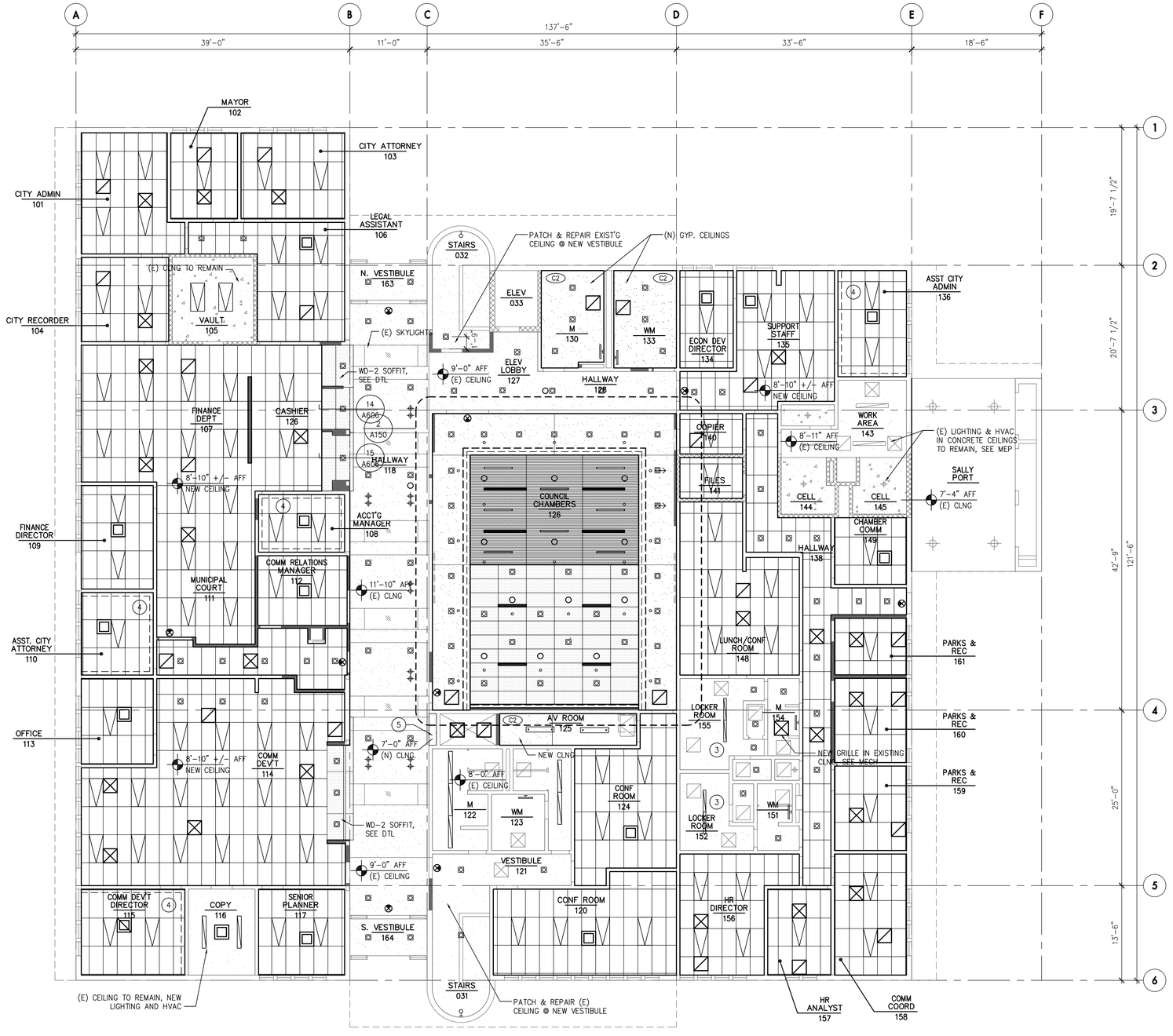
Issue	Revision	Date
100% CD		12/14/18

REFLECTED CEILING PLAN - BASEMENT

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A200



1 REFLECTED CEILING PLAN - GROUND LEVEL
SCALE: 1/8" = 1'-0"

NOTES THIS SHEET

1. INSTALL NEW CEILINGS THROUGHOUT GROUND LEVEL AS SHOWN; CEILINGS TO BE TYPE C1, UNO
2. MODIFY SPRINKLER SYSTEM AS NEEDED FOR NEW CEILINGS AND LIGHTING
3. CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITIONS AND ALERT ARCHITECT AND OWNER TO ANY DISCREPANCIES FOUND
4. COORDINATE LOCATION OF ALL CEILING ITEMS NOT SHOWN WITH ARCHITECT
5. NEW ACOUSTICAL CEILINGS TO BE LOCATED SLIGHTLY LOWER THAN EXISTING WALL HEADS, BUT AS HIGH AS POSSIBLE, UNO. EXISTING AND NEW WALLS WILL INTERRUPT ALL NEW CEILING GRIDS TO ENHANCE ACOUSTICAL SEPARATION. RE-BRACE WALL HEADS TO ROOF STRUCTURE AS NEEDED.
6. PATCH AND REPAIR CEILING FINISHES AS NEEDED TO MATCH ADJACENT EXISTING WHERE EXISTING ITEMS ARE DEMOLISHED, MOVED OR ALTERED.
7. CENTER ALL CEILING ITEMS IN TILE MODULE, OR SYMMETRICAL IN ROOM OR SOFFIT, UNO.
8. HEIGHTS OF EXISTING ELEMENTS ARE APPROXIMATE, FIELD VERIFY.
9. NEW WINDOW COVERINGS TO BE OFOI, UNO. CONTRACTOR TO COORDINATE ACCESS WITH OWNER'S WINDOW COVERING INSTALLER.
10. BASEMENT EXIT SIGNS TO REMAIN AS-IS

LEGEND

- ACOUSTIC CEILING TILE
- PLASTER OR GYP BOARD CEILING
- CONCRETE SLAB CEILING
- WOOD GRILL CEILING, WCP-3
- WOOD PANEL CEILING, WCP-2
- SURFACE MOUNT LINEAR LIGHTING
- PENDANT MOUNT LINEAR LIGHTING
- 2x2 / 2X4 RECESSED TROFFER LIGHTING
- HVAC CASETTE, SEE MECH
- LINEAR DIFFUSERS, SEE MECH
- HVAC SUPPLY, SEE MECH
- HVAC RETURN/EXHAUST, SEE MECH
- RECESSED DOWNLIGHT
- SURFACE MOUNT LIGHTING
- WALL SCONCE LIGHTING
- STRIP LIGHTING
- RECESSED COVE LIGHTING
- SPEAKERS, REF. A/V
- COVERED SPRINKLERS, REF. PLUMBING
- 2" X 4' LINEAR LIGHT FIXTURE, REF. ELEC.

KEY NOTES

1. INSTALL NEW FLOOR ASSEMBLY TO CONVERT PART OF EXISTING SHAFT INTO STORAGE ROOM AT GROUND LEVEL, SEE PLANS
2. INSTALL NEW FIRE RATED CEILING ASSEMBLY TO ENCLOSE BOTTOM OF SHAFT; FIRESTOP ALL PENETRATING ITEMS IN ACCORDANCE WITH CODE
3. SELECTED (E) HVAC ELEMENTS TO REMAIN, SEE MEP
4. EXTEND EXISTING PERIMETER WALLS TO STRUCTURE ABOVE, AS INDICATED BY DASHED LINE, SEE DETAIL 20/A601. ALSO INSTALL ACOUSTIC SEALANT AT BASE OF WALL.
5. DEMOLISH EXISTING SOFFIT AND RE-FRAME AT HIGHER ELEVATION, NEW CEILING TYPE C2

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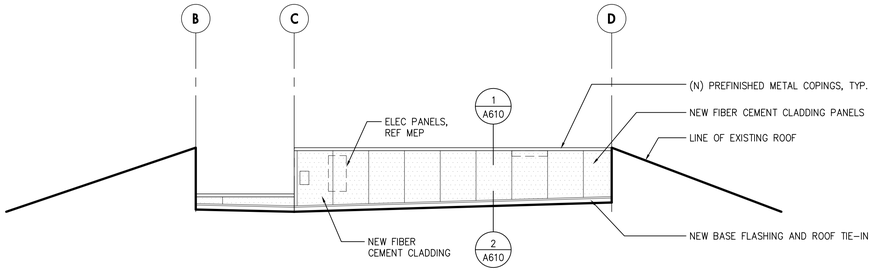
100% CD		12/14/18

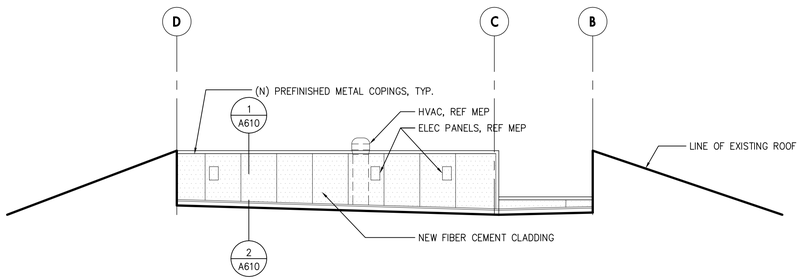
REFLECTED CEILING PLAN - GROUND LEVEL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A201



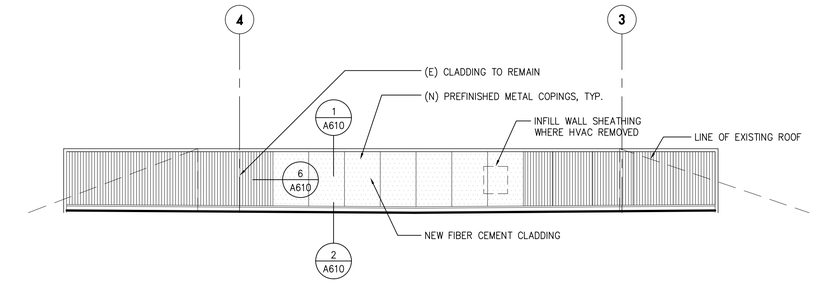
1 MECHANICAL WELL - NORTH WALL

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



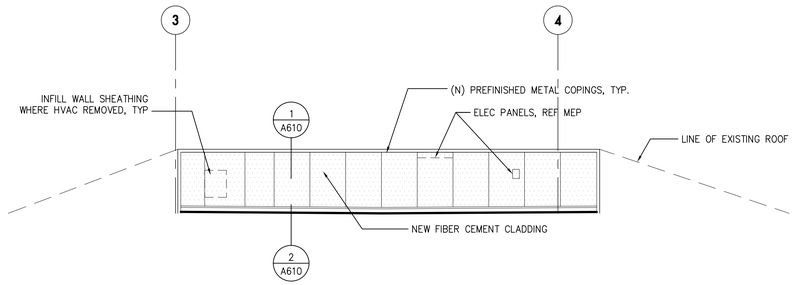
2 MECHANICAL WELL - SOUTH WALL

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



3 MECHANICAL WELL - WEST WALL

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



4 MECHANICAL WELL - EAST WALL

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

NOTES THIS SHEET

1. ALL EXISTING PAINTED SURFACES TO BE PREPPED AND RE-PAINTED
2. REPLACE ALL FLASHINGS ADJOINING NEW CLADDING
3. PROVIDE SEALS AND WATERPROOFING AROUND ALL NEW AND EXISTING ENVELOPE PENETRATIONS
4. REFERENCE MEP DRAWINGS FOR PANELS, DEVICES, VENTS AND OTHER MEP ITEMS NOT SHOWN
5. INFILL ALL HOLES LEFT BY DEMOLISHED ITEMS WITH NEW FRAMING AND SHEATHING
6. REMOVE AND REINSTALL ALL EXISTING RACEWAYS, BOXES AND OTHER ITEMS NEEDED TO COMPLETE NEW WORK

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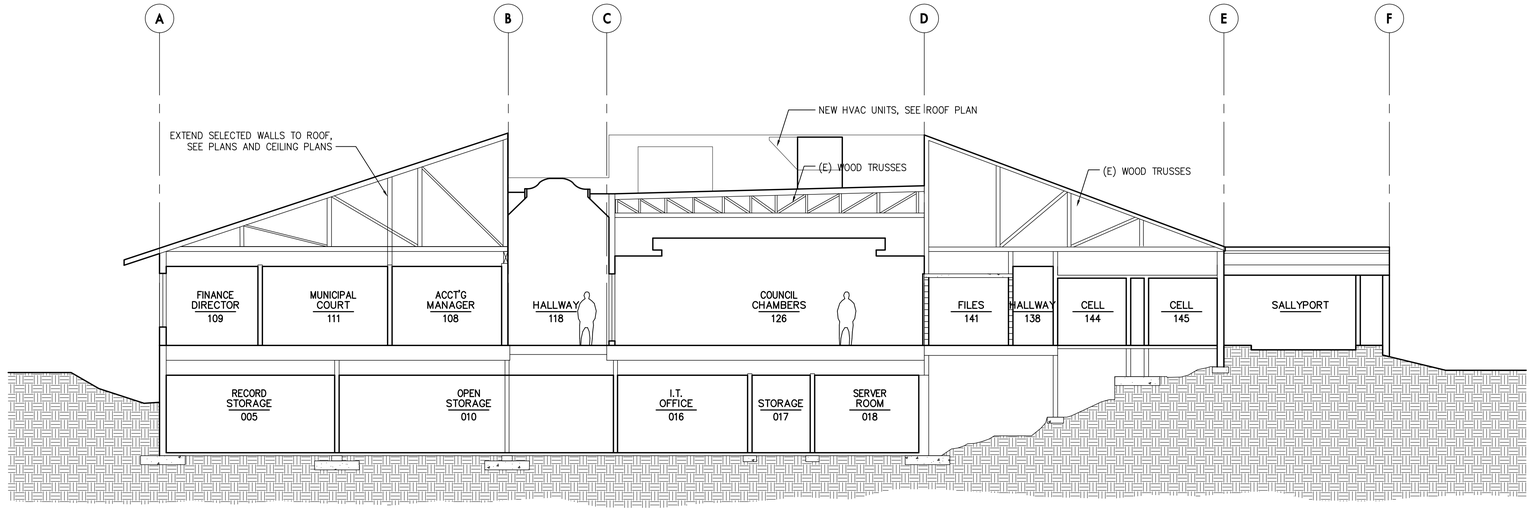
Issue	Revision	Date
100% CD		12/14/18

EXTERIOR ELEVATIONS

Scale 1/8" = 1'-0"

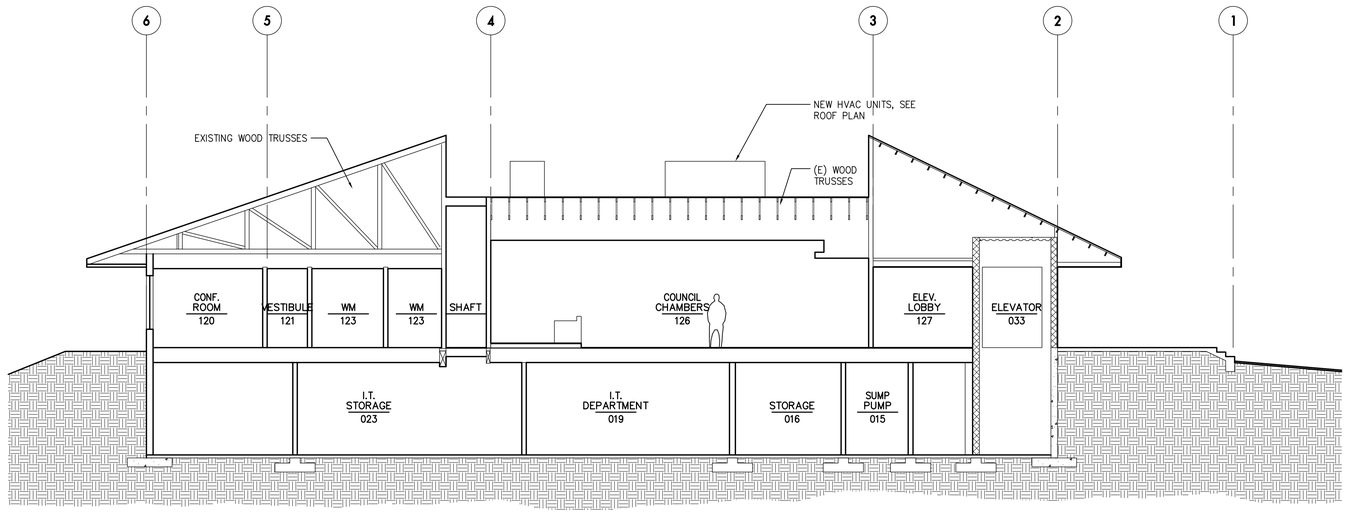
Date DECEMBER 14, 2018

Sheet No. A301



1 BUILDING SECTION - EAST/WEST

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



2 BUILDING SECTION - NORTH/SOUTH

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

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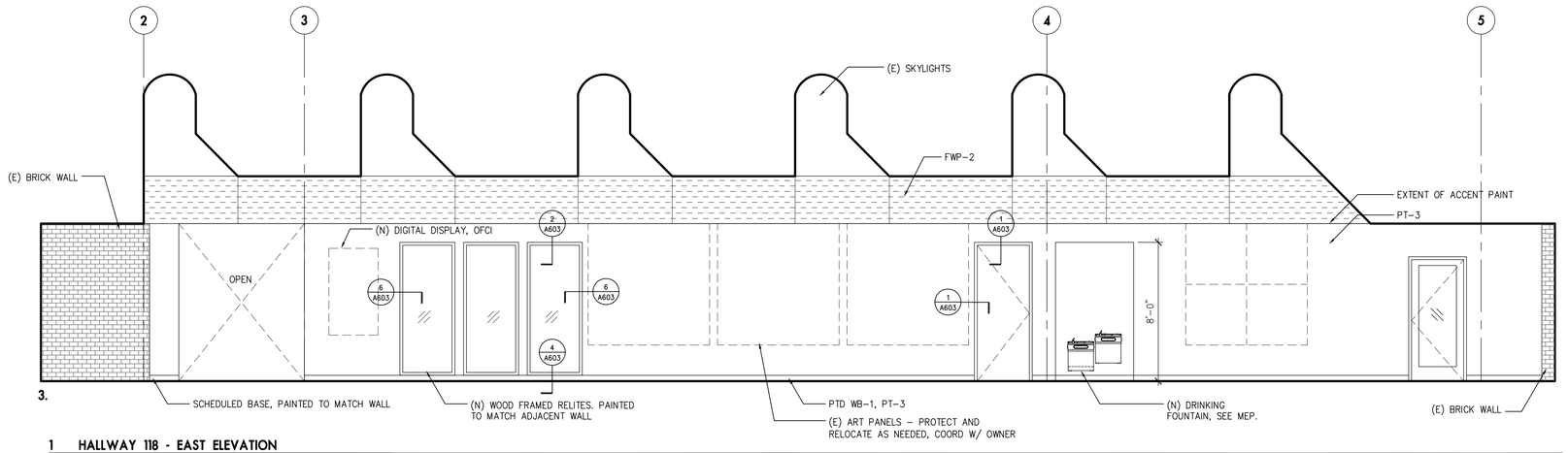
100% CD		12/14/18

BUILDING SECTION

Scale 1/8" = 1'-0"

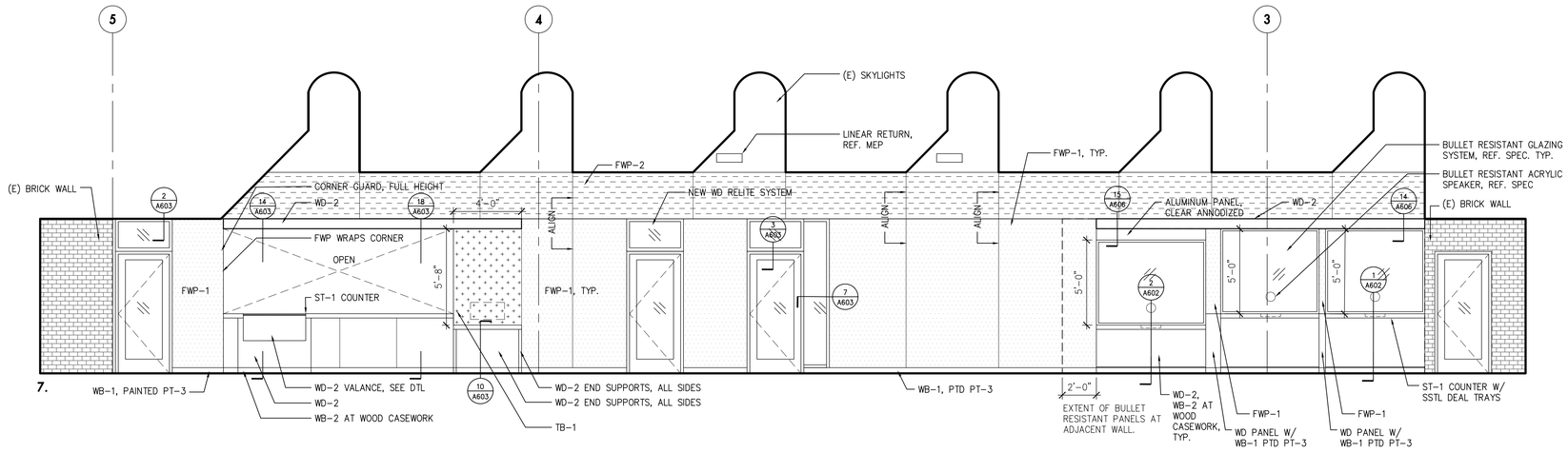
Date DECEMBER 14, 2018

Sheet No. A401



1 HALLWAY 118 - EAST ELEVATION

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



1 HALLWAY 118 - WEST ELEVATION

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

NOTES THIS SHEET

1. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND HEIGHTS

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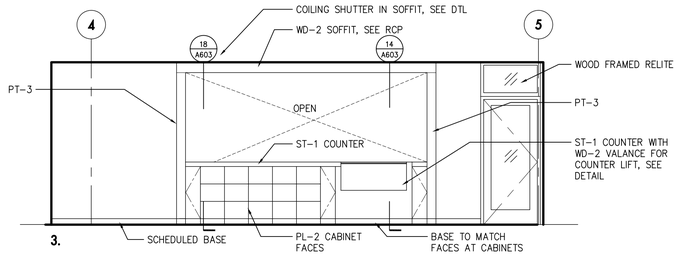
100% CD		12/14/18

INTERIOR ELEVATIONS

Scale 1/4" = 1'-0"

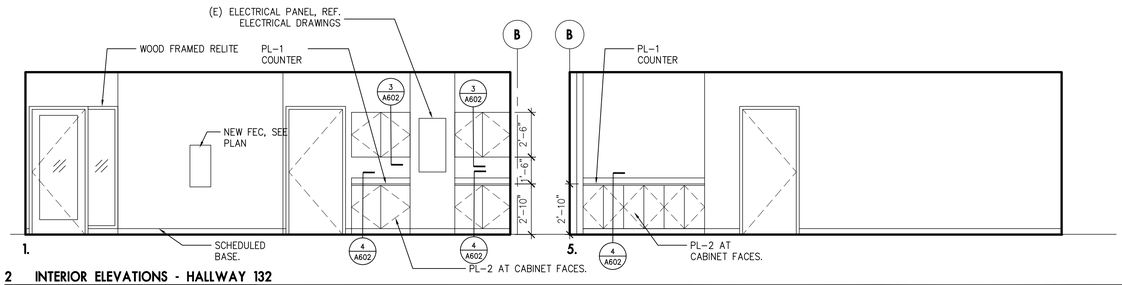
Date DECEMBER 14, 2018

Sheet No. A501



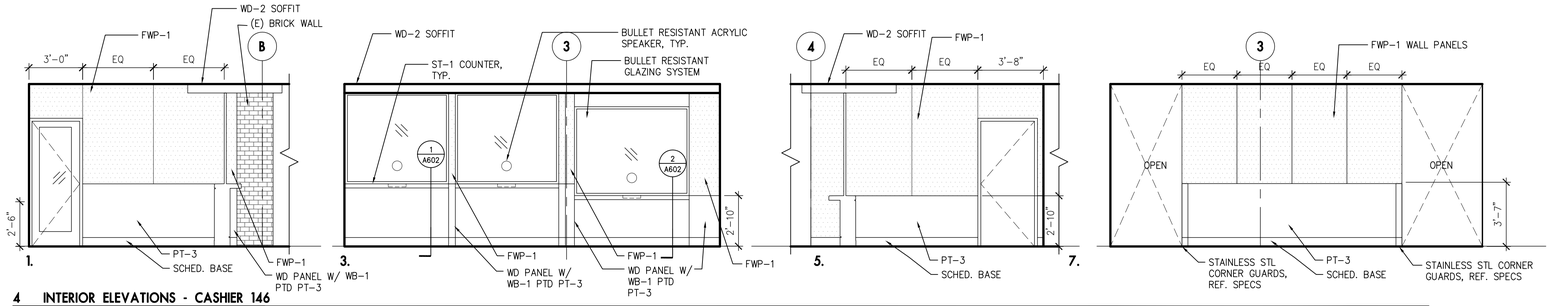
1 INTERIOR ELEVATIONS - COMM DEV'T 114

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



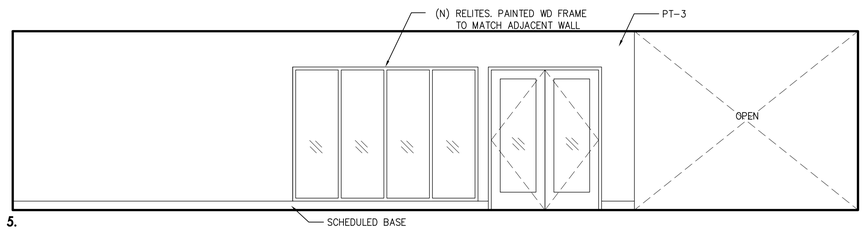
2 INTERIOR ELEVATIONS - HALLWAY 132

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



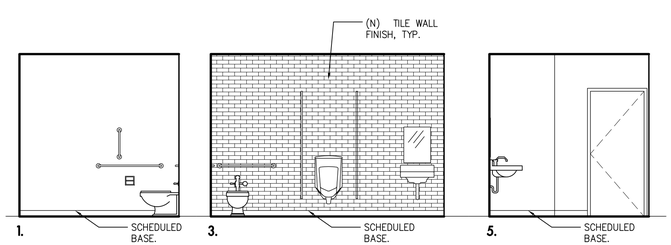
4 INTERIOR ELEVATIONS - CASHIER 146

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



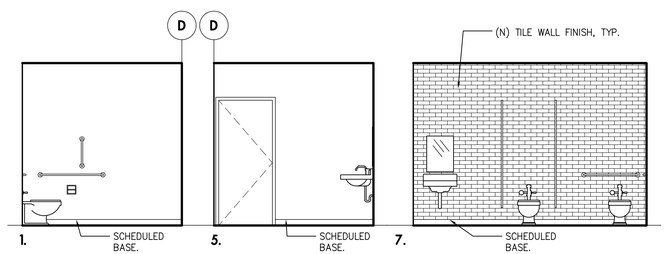
5 INTERIOR ELEVATIONS - HALLWAY 126

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



6 INTERIOR ELEVATIONS - MEN 130

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



7 INTERIOR ELEVATIONS - WOMEN 133

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

NOTES THIS SHEET

1. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND HEIGHTS

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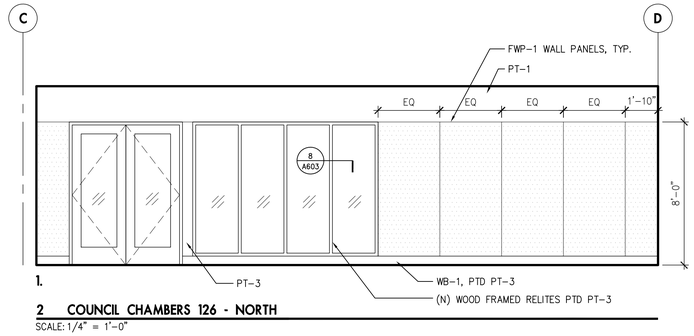
100% CD		12/14/18

INTERIOR ELEVATIONS

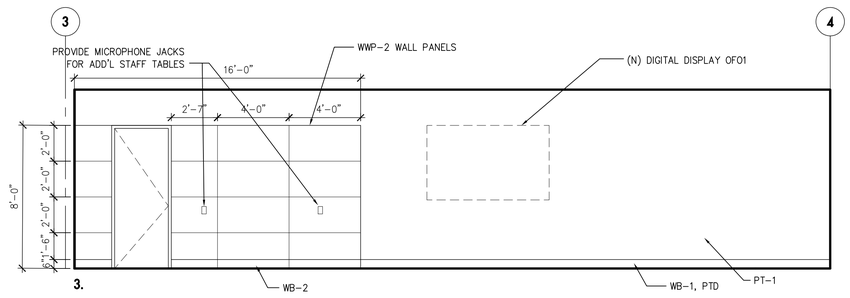
Scale 1/4" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A502



1.

2 COUNCIL CHAMBERS 126 - NORTH

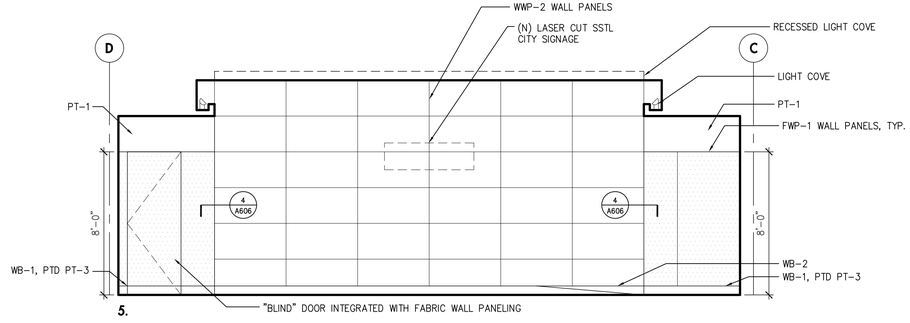
SCALE: 1/4" = 1'-0"



3.

2 COUNCIL CHAMBERS 126 - EAST

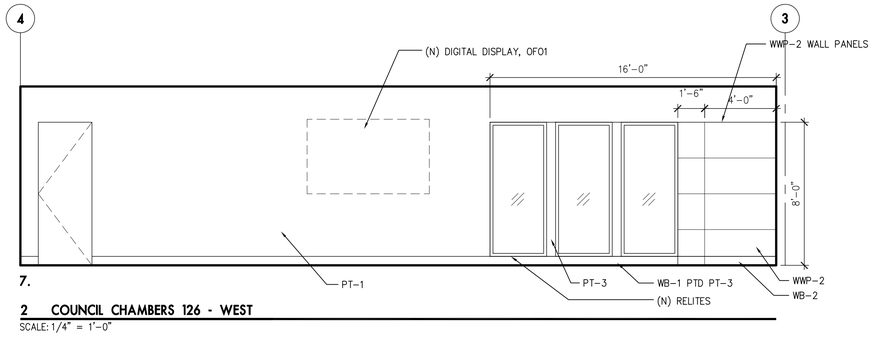
SCALE: 1/4" = 1'-0"



5.

2 COUNCIL CHAMBERS 126 - SOUTH

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



7.

2 COUNCIL CHAMBERS 126 - WEST

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

NOTES THIS SHEET

1. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND HEIGHTS

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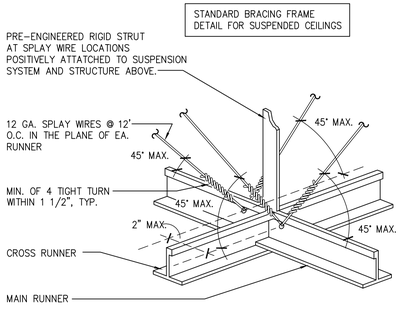
100% CD		12/14/18

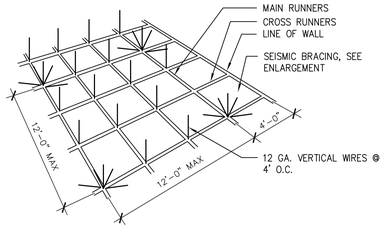
INTERIOR ELEVATIONS

Scale 1/4" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A503



CEILING GRID SEISMIC BRACING DETAIL

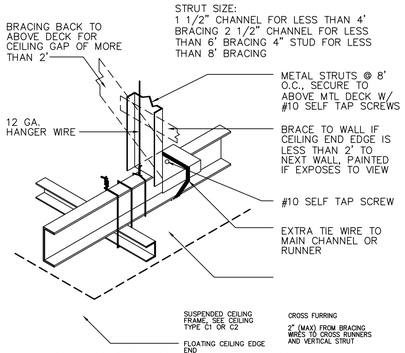
NOTES:
1. PROVIDE 2" MIN HORIZ. FLANGE AT PERIMETER CLOSURE ANGLES.
2. ATTACH GRID TO TWO ADJACENT WALLS
3. SPLAY WIRE CONNECTIONS TO SUPPORT 200 LBS
4. HEAVY DUTY (HD) T-BAR SYSTEM SHALL BE USED.



CEILING GRID BRACING LAYOUT PLAN

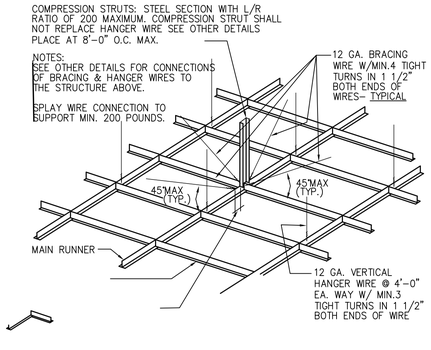
17 SUSPENDED CEILING FRAME BRACING PER 97 UBC STANDARD 25-2

nts



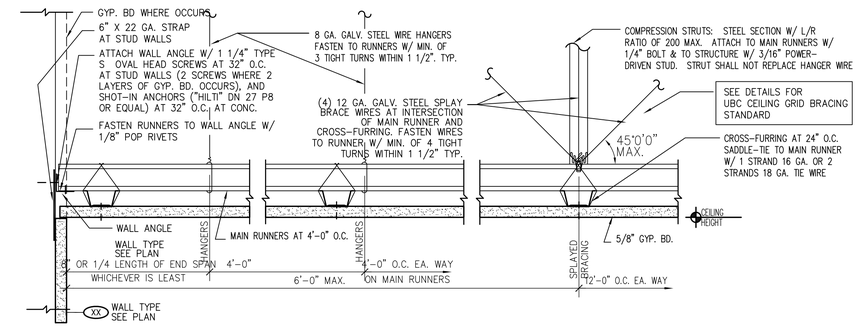
18 FLOATING CEILING EDGE BRACING

nts



14 TYPICAL SUSPENDED CEILING STRUCTURE

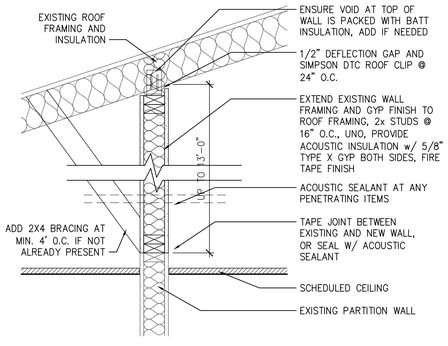
nts



19 SUSPENDED GYPSUM BOARD CEILING

nts

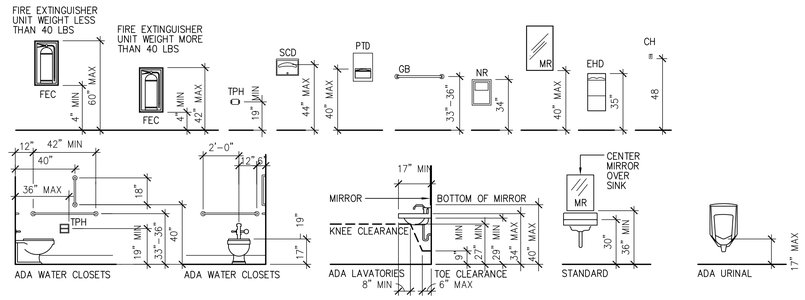
ggate_0901



20 SECTION - WALL HEAD EXTENSION

Scale: 1" = 1'-0"

wb city hall_0620



1 STANDARD MOUNTING HEIGHTS

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

wb city hall_1001

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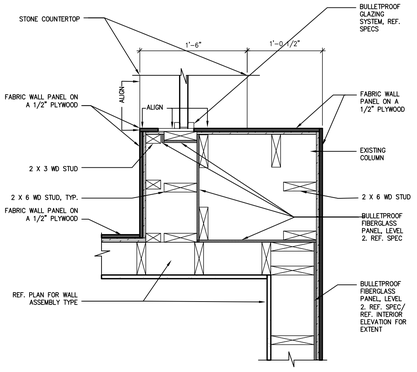
WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

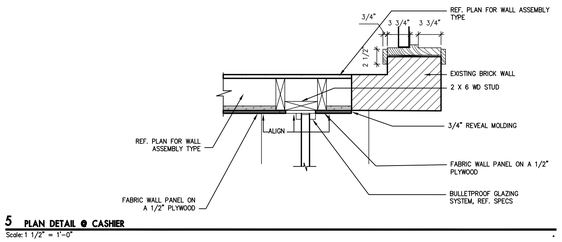
Issue	Revision	Date
100% CD		12/14/18

DETAILS - INTERIOR

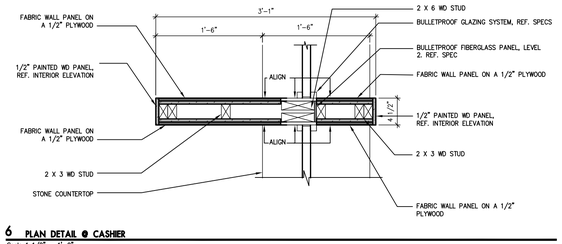
Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. A601



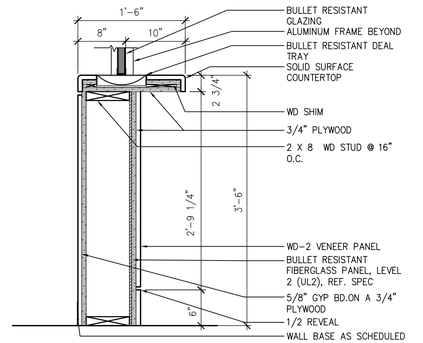
14 PLAN DETAIL @ CASHIER
Scale: 1 1/2" = 1'-0"



5 PLAN DETAIL @ CASHIER
Scale: 1 1/2" = 1'-0"

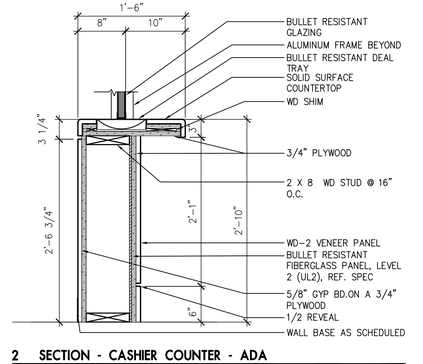


6 PLAN DETAIL @ CASHIER
Scale: 1 1/2" = 1'-0"



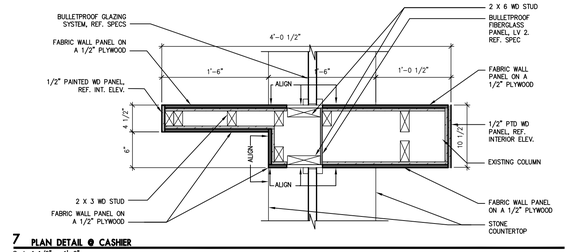
1 SECTION - CASHIER COUNTER - HIGH
Scale: 1" = 1'-0"

wb city hall_0610

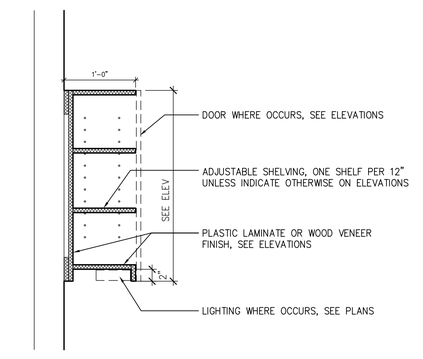


2 SECTION - CASHIER COUNTER - ADA
Scale: 1" = 1'-0"

wb city hall_0610

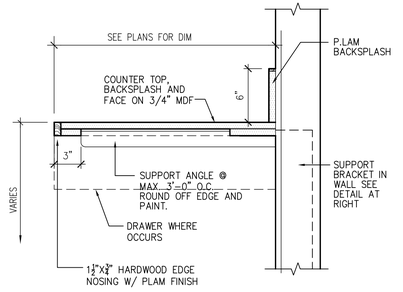


7 PLAN DETAIL @ CASHIER
Scale: 1 1/2" = 1'-0"



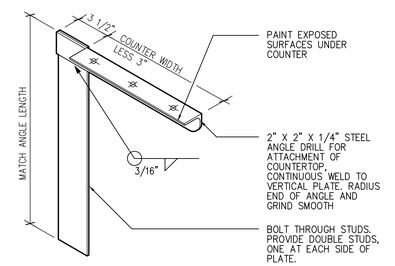
3 SECTION - UPPER CABINET
Scale: 1"=1'-0"

wb city hall_0601



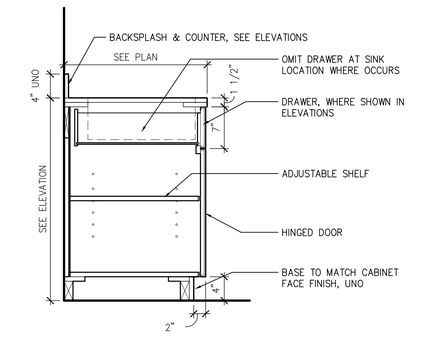
12 SECTION - COUNTER
Scale: 1-1/2"=1'-0"

wb city hall_0602



8 METAL COUNTER BRACKET
Scale: 1-1/2"=1'-0"

wb city hall_0602



4 SECTION - LOWER CABINET
Scale: 1"=1'-0"

wb city hall_0601

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Issue	Revision	Date
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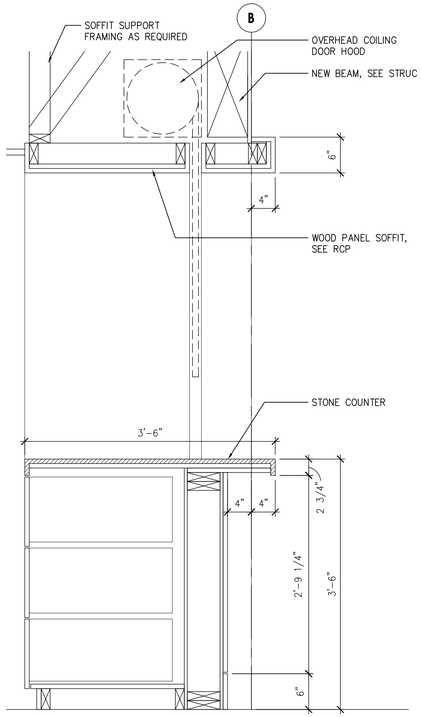
DETAILS - INTERIOR

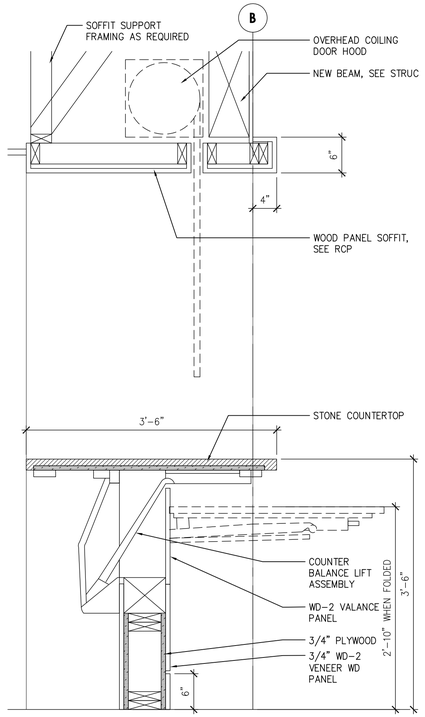
Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. A602



18 SECTION - COMM. DEV. COUNTER

Scale: 1" = 1'-0"

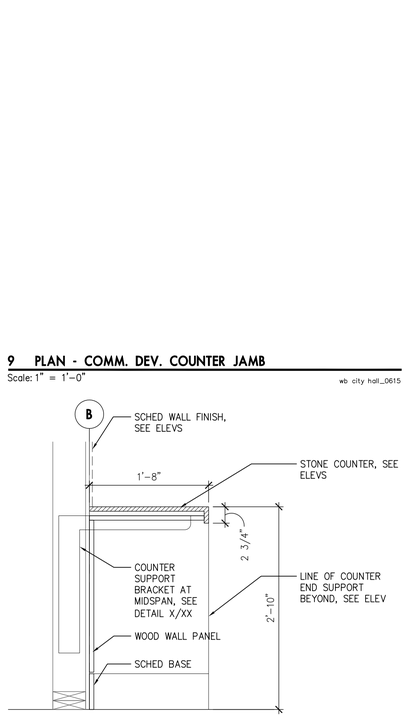
wb city hall_0615



14 SECTION - COMM. DEV. ADA COUNTER

Scale: 1" = 1'-0"

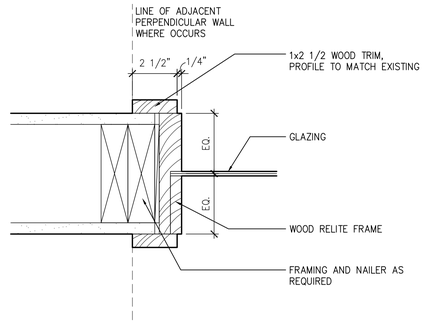
wb city hall_0615



10 SECTION - COMM. DEV. KIOSK

Scale: 1" = 1'-0"

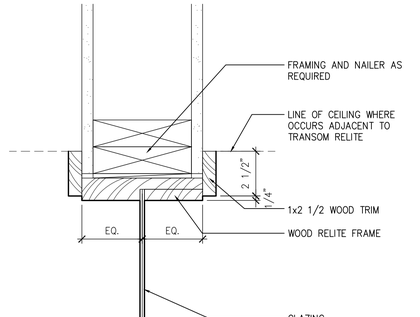
wb city hall_0615



6 PLAN - RELITE JAMB AT WALL

Scale: 3" = 1'-0"

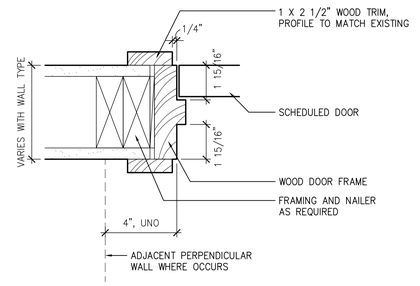
wb city hall_0810



2 SECTION - RELITE HEAD

Scale: 3" = 1'-0"

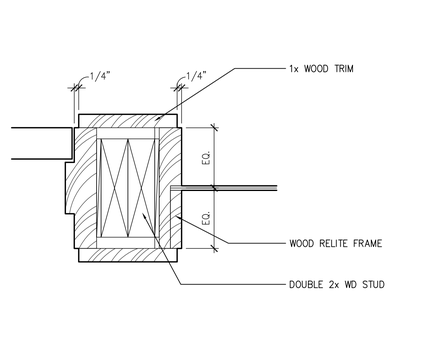
wb city hall_0810



1 WOOD DOOR JAMB/HEAD IN NEW WALL

Scale: 3" = 1'-0"

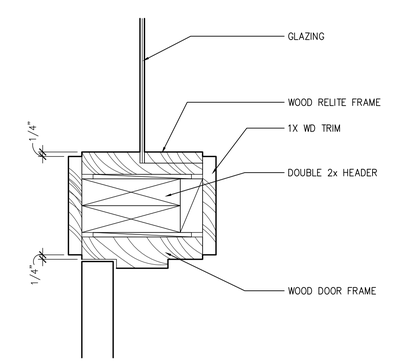
wb city hall_0802



7 PLAN - RELITE JAMB AT ADJACENT DOOR

Scale: 3" = 1'-0"

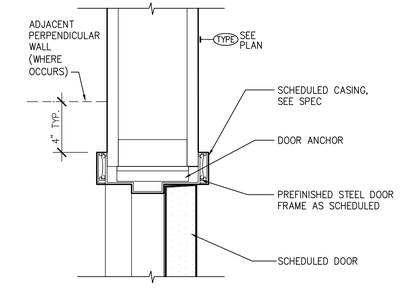
wb city hall_0810



3 SECTION - TRANSOM RELITE SILL ABOVE DOOR

Scale: 3" = 1'-0"

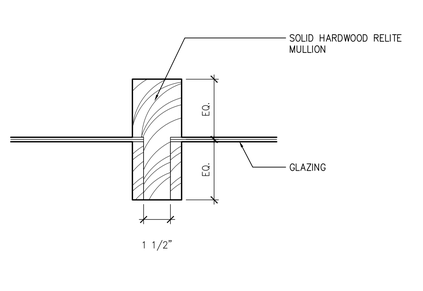
wb city hall_0810



12 SECTION/PLAN - DOOR HEAD/JAMB

Scale: 3" = 1'-0"

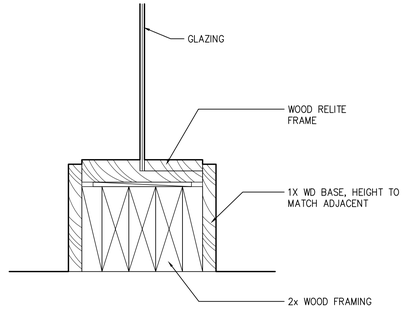
wb city hall_0811



8 PLAN - INTERMEDIATE MULLION AT RELITES

Scale: 3" = 1'-0"

wb city hall_0810



4 SECTION - RELITE BASE

Scale: 3" = 1'-0"

wb city hall_0810

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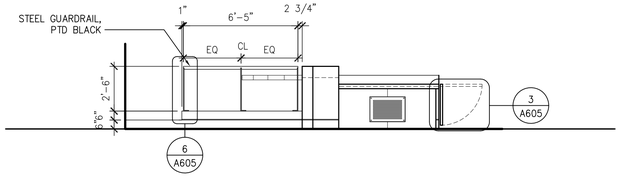
270 Montgomery St.
Woodburn, OR 97071

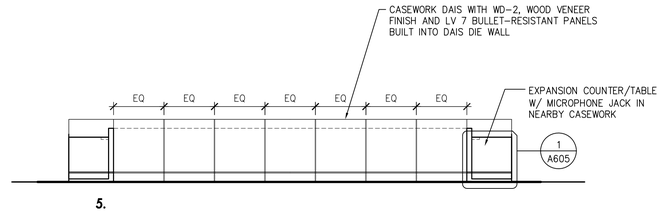
Issue	Revision	Date
100% CD		12/14/18

DETAILS - INTERIOR

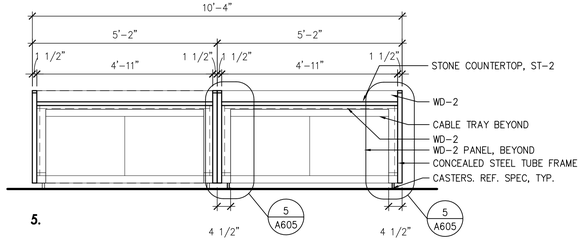
Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. A603



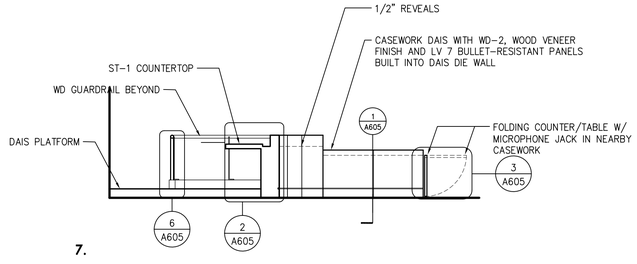
4 COUNCIL CHAMBER DAIS 126 - ELEVATION
SCALE: 1/4" = 1'-0"



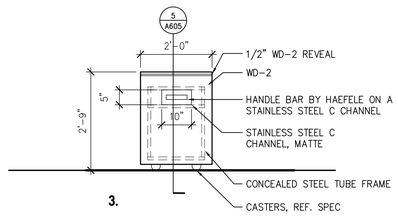
1 COUNCIL CHAMBER DAIS 126 - ELEVATION
SCALE: 1/4" = 1'-0"



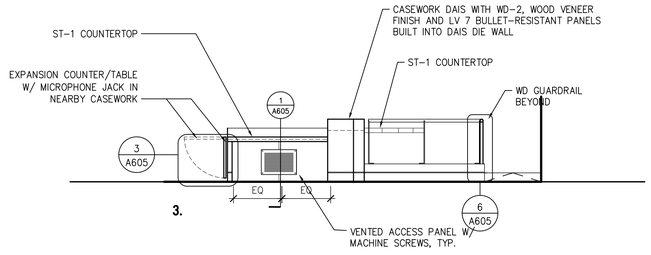
5 COUNCIL CHAMBER ROOM 126 - TESTIMONY TABLE ELEV. TYP.
SCALE: 1/2" = 1'-0"



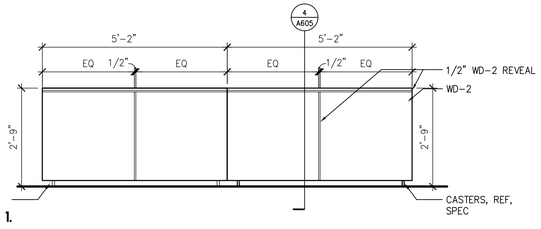
1 COUNCIL CHAMBER DAIS 126 - ELEVATION
SCALE: 1/4" = 1'-0"



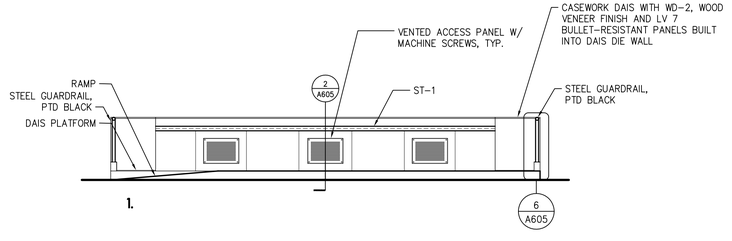
6 COUNCIL CHAMBER ROOM 126 - TESTIMONY TABLE SIDE ELEV. TYP.
SCALE: 1/2" = 1'-0"



2 COUNCIL CHAMBER DAIS 126 - ELEVATION
SCALE: 1/4" = 1'-0"



7 COUNCIL CHAMBER ROOM 126 - TESTIMONY TABLE ELEV. TYP.
SCALE: 1/2" = 1'-0"



3 COUNCIL CHAMBER DAIS 126 - ELEVATION
SCALE: 1/4" = 1'-0"

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Issue	Revision	Date
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DETAILS - INTERIOR

Scale AS NOTED
Date DECEMBER 14, 2018
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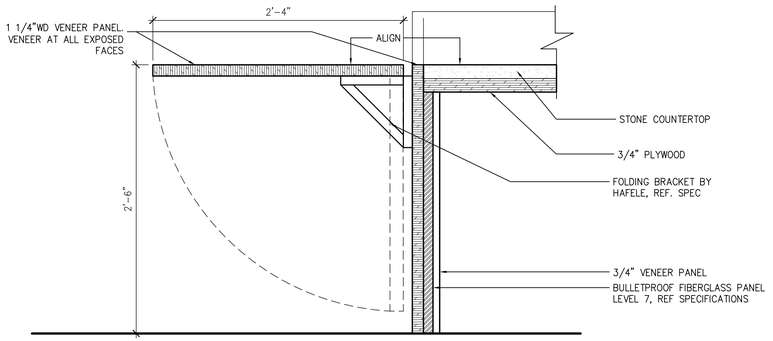
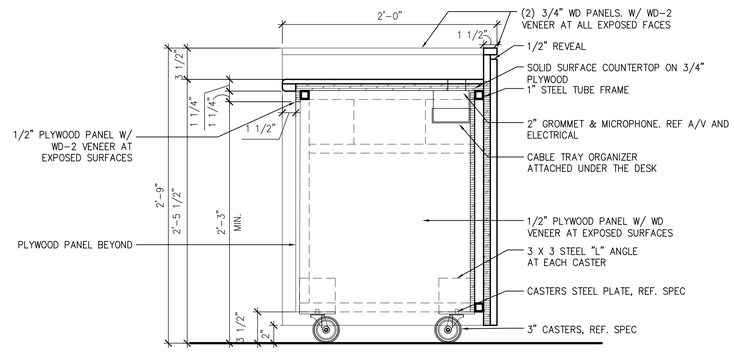


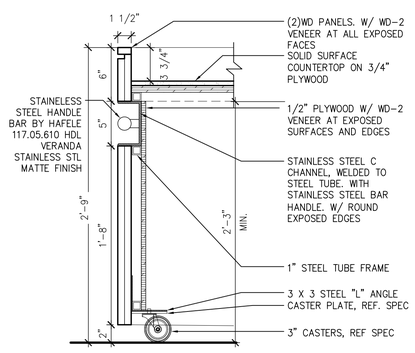
3 SECTION @ TESTIMONY TABLE FOLDING PANEL

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



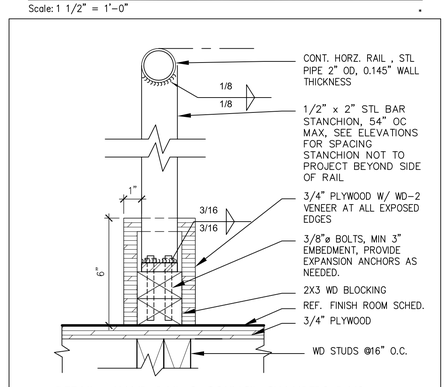
4 SECTION @ TESTIMONY TABLE

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



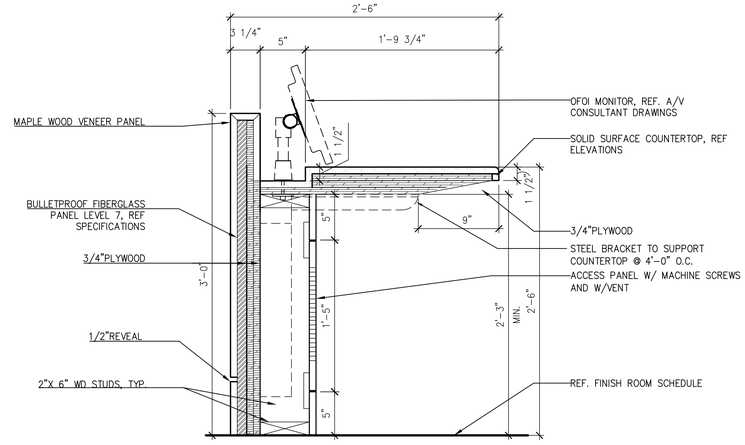
5 SECTION @ TESTIMONY TABLE

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



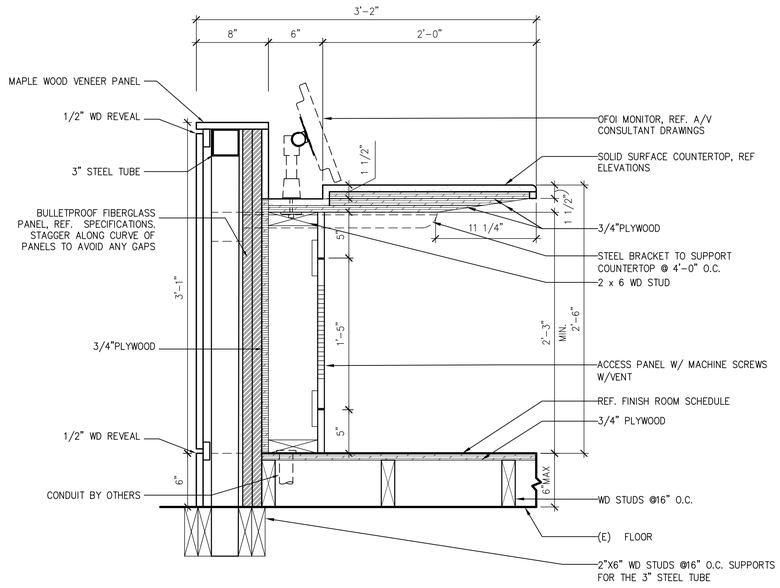
6 DETAIL - HAND RAIL @ COUNCIL CHAMBERS DAIS

Scale: 3" = 1' - 0"



1 SECTION DETAIL @ COUNCIL CHAMBER DAIS

Scale: 1 1/2"



2 SECTION DETAIL @ COUNCIL CHAMBER DAIS

Scale: 1 1/2"

x-Dais_Details

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DETAILS - INTERIOR

Scale	AS NOTED
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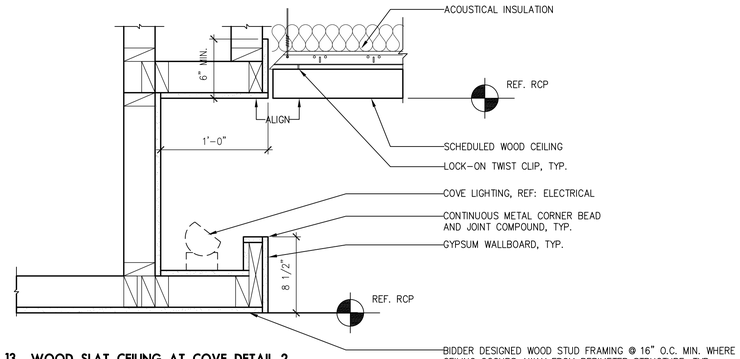
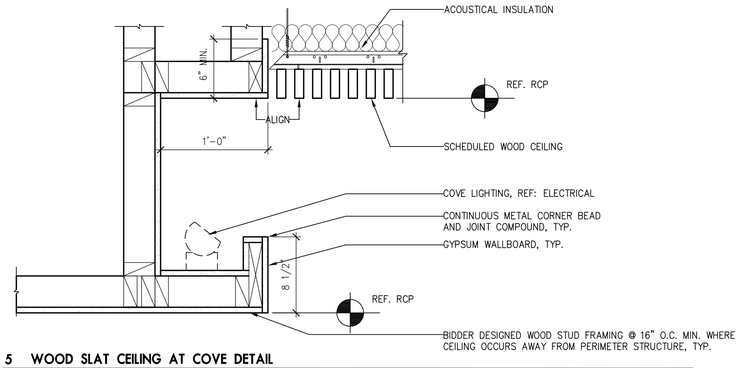
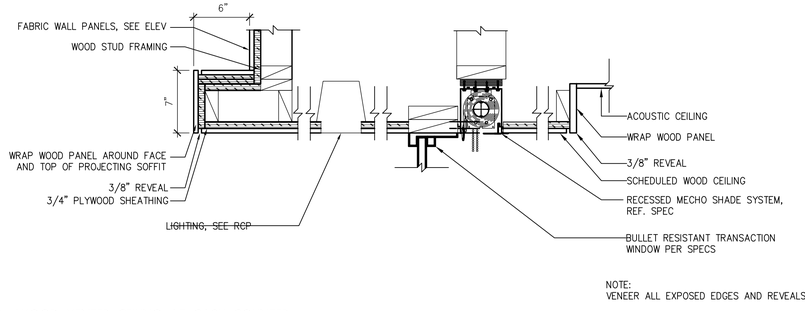


13 WOOD SLAT CEILING AT COVE DETAIL 2
Scale: 1 1/2" = 1' - 0"

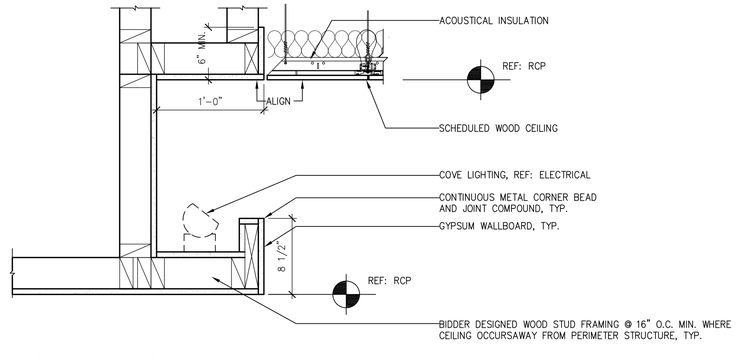


5 WOOD SLAT CEILING AT COVE DETAIL
Scale: 1 1/2" = 1' - 0"

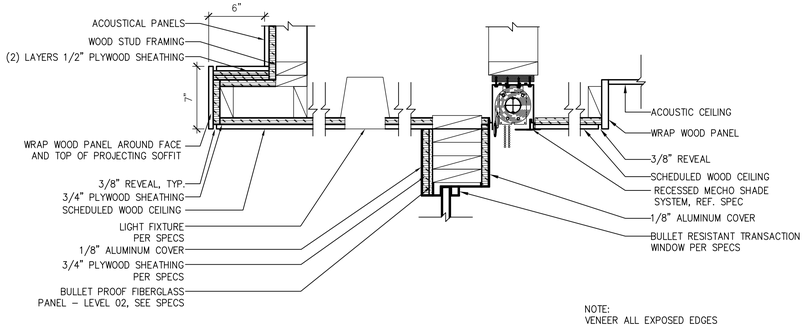


NOTE:
VENEER ALL EXPOSED EDGES AND REVEALS

14 WOOD VENEER CEILING AT CASH COUNTER
Scale: 1 1/2" = 1' - 0"

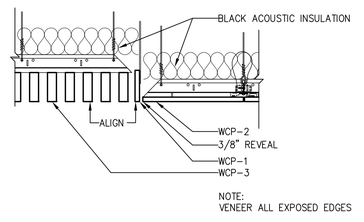


6 ACOUSTICAL CEILING AT COVE DETAIL
Scale: 1 1/2" = 1' - 0"



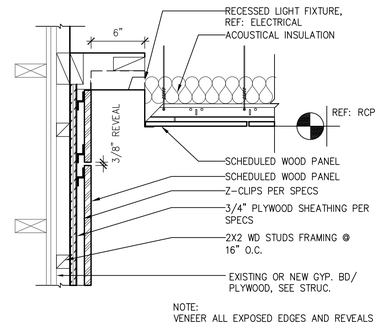
NOTE:
VENEER ALL EXPOSED EDGES

15 WOOD VENEER CEILING AT ADA CASH COUNTER
Scale: 1 1/2" = 1' - 0"



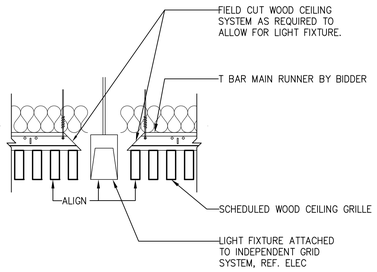
NOTE:
VENEER ALL EXPOSED EDGES

7 WOOD PANEL TO WOOD PANEL TRANSITION
Scale: 1 1/2" = 1' - 0"

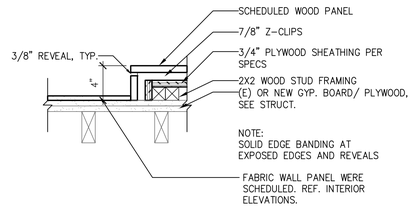


NOTE:
VENEER ALL EXPOSED EDGES AND REVEALS

3 WOOD PANEL TO ACOUSTIC CEILING TRANSITION DETAIL
Scale: 1 1/2" = 1' - 0"



8 LIGHTING AT WOOD CEILING PANELS
Scale: 1 1/2" = 1' - 0"



4 WOOD PANEL WALL CORNER DETAIL
Scale: 1 1/2" = 1' - 0"

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REGISTERED ARCHITECT
2919
DAVID T. HYMAN
PORTLAND, OREGON
STATE OF OREGON

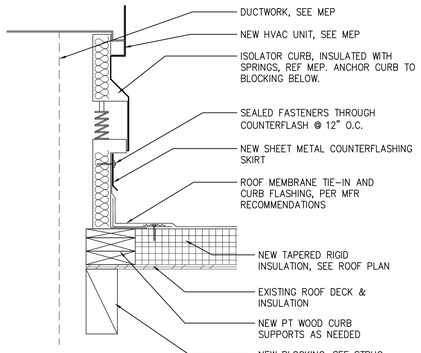
WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

DETAILS - INTERIOR

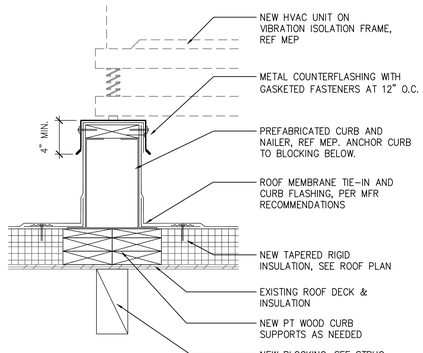
Scale AS NOTED
Date DECEMBER 14, 2018
Sheet No. A606



13 SECTION - HVAC UNIT CURB (AHU)

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

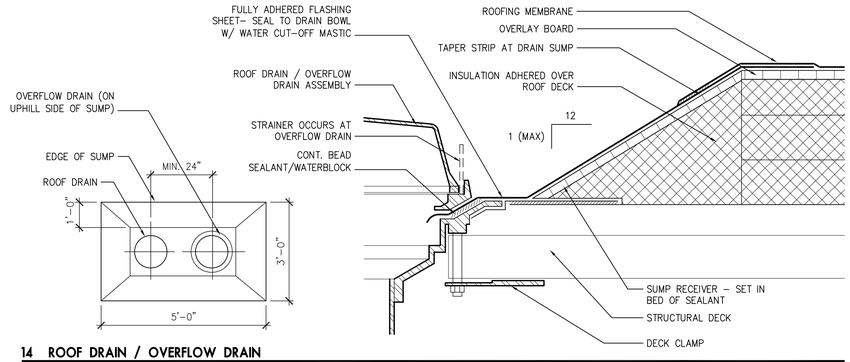
wb city hall_0712



9 SECTION - HVAC UNIT CURB

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

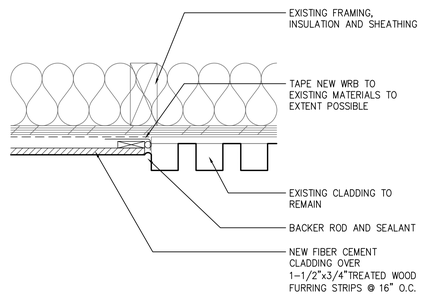
wb city hall_0712



14 ROOF DRAIN / OVERFLOW DRAIN

Scale: 3"=1'-0"

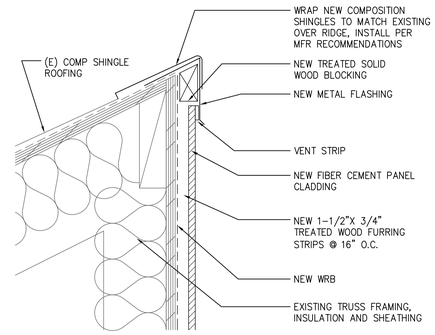
armz_0720



6 PLAN - CLADDING TRANSITION

Scale: 3" = 1'-0"

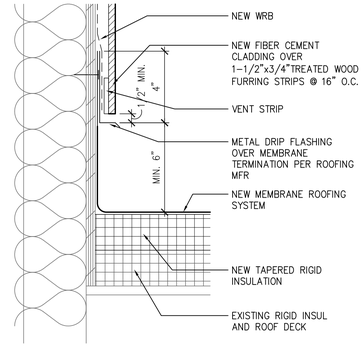
wb city hall_0710



1 SECTION - RIDGE @ NEW CLADDING

Scale: 3" = 1'-0"

wb city hall_0710



2 SECTION - WALL BASE @ NEW CLADDING

Scale: 3" = 1'-0"

wb city hall_0710

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270 Montgomery St.
Woodburn, OR 97071

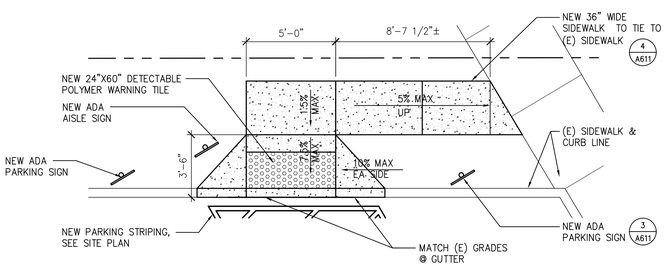
Issue	Revision	Date
100% CD		12/14/18

DETAILS - EXTERIOR

Scale AS NOTED

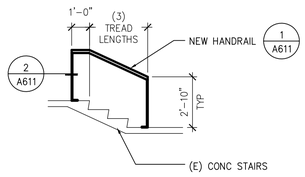
Date DECEMBER 14, 2018

Sheet No. A610



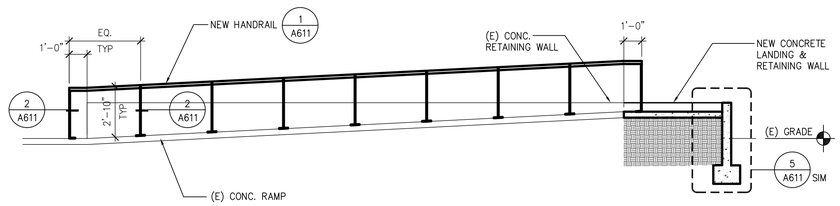
7 NEW EXTERIOR RAMP

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



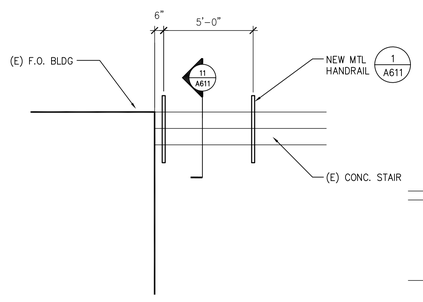
11 HANDRAIL SECTION

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



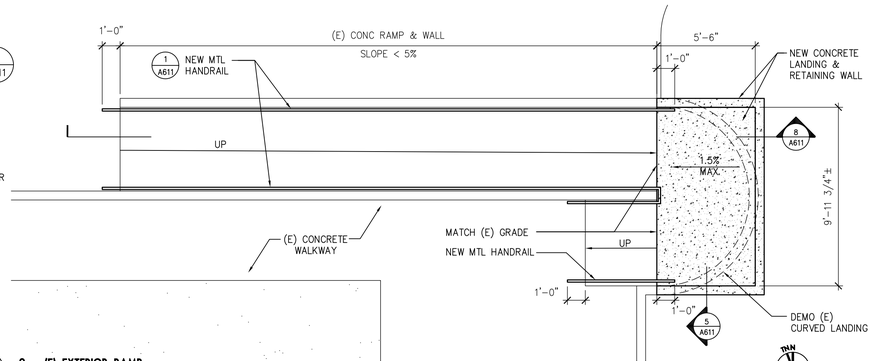
8 (E) EXTERIOR RAMP SECTION

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



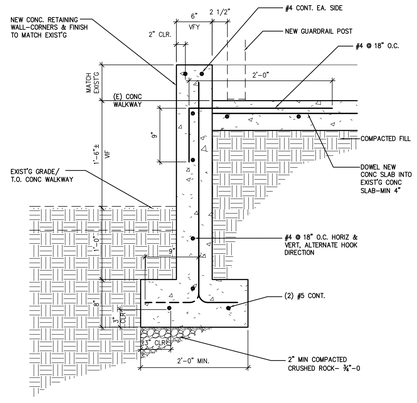
12 (E) EXTERIOR STAIR

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



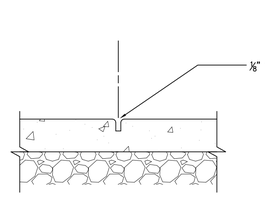
9 (E) EXTERIOR RAMP

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



5 CONCRETE WALL DTL

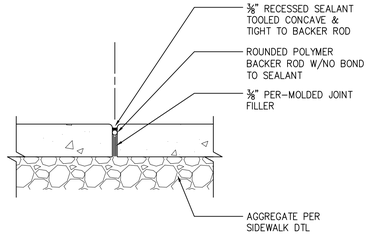
SCALE: 1" = 1'-0"



10 CONCRETE CONTROL JOINT

Scale: NTS

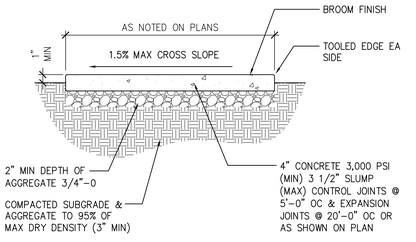
wb city hall_0611



6 CONCRETE EXPANSION JOINT

Scale: NTS

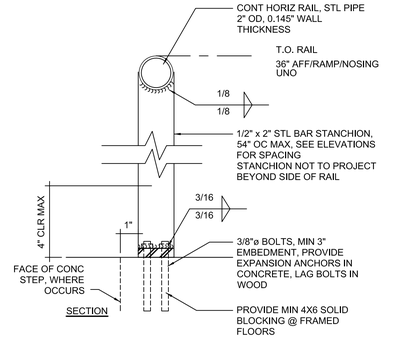
wb city hall_0611



4 CONCRETE SIDEWALK

Scale: NTS

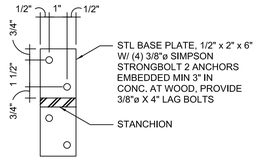
wb city hall_0611



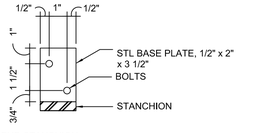
1 DETAIL - HAND RAIL

Scale: 3" = 1'–0"

wb city hall_0611



PLAN - INTERMEDIATE STANCHION

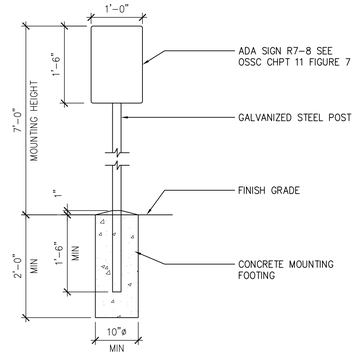


PLAN - END STANCHION

2 DETAIL - HAND RAIL

Scale: 3" = 1'–0"

wb city hall_0611



3 ADA COMPLIANT PARKING SIGN

Scale: NTS

wb city hall_0611

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WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

ENLARGED SITE PLANS & SITE DETAILS

Scale AS NOTED

Date DECEMBER 14, 2018

Sheet No. A611

MATERIAL & FINISH LEGEND

CODE	MFGR.	DESCRIPTION	COLOR/FINISH	SPECIFICATION NOTES	LOCATIONS*	CONTACT
06 & 08 WOOD						
WD-1		oak to match existing	clear seal			
WD-2		maple to match architect's sample	clear seal			
06 20 00 WOOD BASE						
WB-1		solid 1x6 wood wall base, hemlock or approved equal	painted to match wall			
WB-2		solid 1x6 wood wall base, clear maple to match arch sample	clear			
06 40 00 PLASTIC LAMINATE						
PL-1	Wilsonart	plastic laminate, horizontal grade	Steel Mesh 4879-38 Fine Velvet Finish		counters and splashes	
PL-2	Wilsonart	plastic laminate, horizontal grade	Manitoba Maple 7911-60 Matte		cabinet faces	
06 60 00 SOLID SURFACE						
ST-1	Caesarstone	style: quartz countertop, 3/4" thickness finish: polished	color: 4003 sleek concrete			
ST-2	Caesarstone	style: quartz countertop, 1/2" thickness	color: 4003 sleek concrete			
09 51 00 ACOUSTICAL CEILINGS						
ACT-1	Armstrong	Style: CIRRUS Second Look beveled tegular tile, item 510, pattern II Size: 24 x 48 Grid: Suprafine XL 9/16" exposed tee	Color: White	grid color to match tile		
09 54 26 WOOD PANEL CEILINGS AND WALLS						
WCP-1	9Wood	24x48 solid wood veneer ceiling tiles with lift & lock accessibility series 4300, sku 4324-48, 3/8" panel reveal	hardrock white maple, clear finish	stain to match architect's sample see details for wall mounting - matte finish	council chambers	Rep: Jerald Schwarz 206-218-3489
WCP-2	9Wood	24x48 perforated wood veneer ceiling tiles with lift & lock accessibility series 5400 tiles, install w/ 4000 suspension, sku 5495-08, 3/8" panel reveal	hardrock white maple, clear finish	stain to match architect's sample - matte finish	council chambers	
WCP-3	9Wood	panelized linear wood ceiling, solid 1x6 members, (5) per linear foot. series 1100, sku 1124-5, open reveal at perimeter. w/ caddy lock-on twist clip for accessibility.	hardrock white maple, clear finish	stain to match architect's sample - matte finish	council chambers	
WWP-2	9Wood	24"x48" solid wood veneer tile series 4300	hardrock white maple, clear finish	stain to match architect's sample - matte finish		
09 65 00 RESILIENT FLOORING						
RF-1	Forbo	Marmoleum	Color: 3573 Trace of nature	sealer/polish: Armstrong S-480 Commercial Floor Polish or any cross linked acrylic co-		
RB-1	Johnsonite	Rubber Cove Base, 6" high	Style: Traditional Wall Base, Color: TB1 Peppercorn			
RB-2	Johnsonite	Rubber Cove Base 6" high	TBD		at areas w new CPT-3	
TS-1	Johnsonite	Rubber Reducer Strip	Color: TBD	See Manufacturer's Specs	carpet to resilient	
09 68 00 CARPETING						
CPT-1	Shaw Contract Group	Carpet plank size tile, multi-level pattern loop; Fiber: eco solution q® nylon; Gauge: 1/12 gauge; Stitches per inch: 10; Tufted weight: 24 oz/yd; Size: 18" x 36"; Dye method: 66% solution dyed, 34% yard dyed; Brick Pattern N/S Direction	Collection: Beyond the Fold Style: Folded Tile 5T060 Color: Paprika Twine 60157	See Manufacturer's Specs; Installation method: Direct-glue Installation pattern: Ashlar Secondary Backing: Ecoworx® tile Warranty: Lifetime commercial limited	Typ.	
CPT-2	Shaw Contract Group	Carpet plank size tile, multi-level pattern loop; Fiber: eco solution q® nylon; Gauge: 1/12 gauge; Stitches per inch: 10; Tufted weight: 24 oz/yd; Size: 18" x 36"; Dye method: 66% solution dyed, 34% yard dyed; Herringbone Pattern	Collection: Beyond the Fold Style: Folded Tile 5T060 Color: Paprika Twine 60157	See Manufacturer's Specs; Installation method: Direct-glue Installation pattern: Ashlar Secondary Backing: Ecoworx® tile Warranty: Lifetime commercial limited	Council Chambers	
CPT-3	Interface	Existing	Collection Style: Cubic, Color: Shape 4287		Vestibule 121	
CPT-4	Shaw Contract Group	Gradient Classicbac 5A153 Broadloom, Graphic loop construction . Eco solution Q nylon 100% solution dyed, synthetic backing, classicbac secondary backing, ssp Shaw soil protection protective treatment, 12 feet size, 1/8" gauge, 12 stiches per inch, 0.098 inches finished pile thickness, 11020 per cu.yd average density, .278 inches total thickness, 30.0 oz/yd2 tufted weight, no pattern repeat	Collection Style: Shade Color: Bird's Eye 34761		North Stairs & Council Chamber's elevated dais.	
WM-1	Connexus Flooring	Style: Super Nop 52 roll goods Yarn System: 100% solution dyed UV stabilized polpropylane fibers Total weight: 64 oz/sq drd Pile weight: 37 oz/sq yrd Thickness: 3/8" Backing EcoDi composite rubber	Color: Walnut	see manufacturer's specs; provide manufacturer suggested reducer strip as required		
09 30 00 CERAMIC TILE						
CT-1	United Tile	Wall Tile Style: Mosa; Series: Global Collection/ Globalgrip / Size: 4x12	Color: 15010 white; Finish: Plain Satin			
CT-2	United Tile	Floor tile, Style: Crossville Basalt 12x24	Color: AV293 Bedrock			
CTB-1		Wall Base	TBD			
09 84 13 ACOUSTICAL WALL PANELS						
FWP-1		impact resistant acoustical wall panel, 1" thickness, Acoustical : NRC .15; SAA.80	fabric: Knoll Textiles, Style Arena WC2138/5 Color: Pewter		hallway, council chambers, cashier, others	
FWP-2		impact resistant acoustical wall panel, 1" thickness, Acoustical : NRC .15; SAA.80	fabric: Guilford of Maine, Style: Anchorage 2335 (66") or Open House 2334 (54"), Color: White 2664		hallway, council chambers, cashier, others	
09 91 00 PAINT						
PT-1	Sherwin Williams	general wall paint	Color: 5760W White			
PT-2	Sherwin Williams	ceiling paint	Color: SW 4004 Snowbound			
PT-3	Sherwin Williams	accent grey	Color: SW7642 Pavestone			
PT-4	Sherwin Williams	epoxy for bathrooms	Color: 1580 White			
PT-10	Sherwin Williams	accent color for offices	TBD			
PT-11	Sherwin Williams	accent color for offices	TBD			
PT-12	Sherwin Williams	accent color for offices	TBD			
PT-13	Sherwin Williams	accent epoxy paint for restrooms	TBD			
PT-14	Sherwin Williams	accent color @ columns	TBD			
PT-20	Timely	color for prefinished steel door frames	SC101 Browntone			
09 72 10 TACKABLE PANEL						
TB-1	Forbo	Bulletin Board	TBD		hallway, cashier, others	

10 21 15 PLASTIC TOILET COMPARTMENTS						
TP-1	Bobrick	plastic toilet compartments	SC04 - Forest Green Sierra Series SCRC		Restrooms	

NOTES:

1 Contact information provided to assist in locating materials, but is not intended to limit sources
2 Provide 10'x10' brush-outs of all paint colors for review prior to painting and plan for two brush-out revisions for each color
3 Patch all cracks as needed. Match adjacent conditions and wall paint

* For general reference only. Contractor responsible for verifying all locations in drawings and specifications.

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100% CD		12/14/18

MATERIAL & FINISH LEGEND

Scale NTS
Date DECEMBER 14, 2018
Sheet No. A700

ROOM FINISH SCHEDULE

RM. NO.	ROOM NAME	FLOOR	BASE	CEILING	WALL				REMARKS
					NORTH	EAST	SOUTH	WEST	
BASEMENT									
001	STORAGE				PT-1	PT-1	PT-1	PT-1	
002	VAULT								
003	STORAGE				PT-1	PT-1	PT-1	PT-1	
004	CONFERENCE				PT-1	PT-1	PT-1	PT-1	
005	RECORDS STORAGE				PT-1	PT-1	PT-1	PT-1	
006	TRAINING AREA				PT-1	PT-1	PT-1	PT-1	
007	MUSEUM OFFICE	CPT-1	RB-1		PT-1	PT-1	PT-1	PT-1	
008	BLDG & PLANNING STORAGE	CPT-1	RB-1		PT-1	PT-1	PT-1	PT-1	
009	NOT USED								
010	OPEN STORAGE				PT-1	PT-1	PT-1	PT-1	C
011	STORAGE								
012	ELEV ROOM								
013	STORAGE								
014	RESTROOM								
015	SUMP PUMP								
016	IT OFFICE	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
017	STORAGE								
018	SERVER ROOM								
019	IT DEPARTMENT								
020	STATS STAFF								
021	IT MANAGER								
022	STORAGE								
023	IT STORAGE								
024	STORAGE								
025	ELECTRICAL								
026	NOT USED								
027	VESTIBULE			PT-2	PT-1	PT-1	PT-1	PT-1	
031	SOUTH STAIR	CPT-4	RB-1	PT-2	PT-1	PT-1	PT-1	PT-1	
032	NORTH STAIR	CPT-4	RB-1	PT-2	PT-1	PT-1	PT-1	PT-1	
033	ELEVATOR								
LEVEL 1									
101	CITY ADMINISTRATOR			ACT-1					A
102	MAYOR			ACT-1					A
103	CITY ATTORNEY			ACT-1					A
104	CITY RECORDER			ACT-1	PT-1	PT-10	PT-1	PT-1	
105	VAULT	CPT-1	RB-1	PT-2	PT-1	PT-1	PT-1	PT-1	
106	LEGAL ASSISTANT			ACT-1					A
107	FINANCE DEPARTMENT	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
108	ACCOUNTING MANAGER	CPT-1	RB-1	ACT-1	PT-1	PT-11	PT-1	PT-1	
109	FINANCE DIRECTOR	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-11	PT-1	
110	ASST. CITY ATTORNEY	CPT-1	RB-1	ACT-1	PT-11	PT-1	PT-1	PT-1	
111	MUNICIPAL COURT	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
112	COMM. RELATIONS. MAN.	CPT-1	RB-1	ACT-1	PT-11	PT-1	PT-1	PT-1	
113	OFFICE	CPT-1	RB-1	ACT-1	PT-11	PT-1	PT-1	PT-1	
114	COMM. DEVELOPMENT	CPT-1	RB-1	ACT-1/WCP-1	PT-1	PT-1	PT-1	PT-1	
115	COMM DEV'T DIRECTOR	CPT-1	RB-1	ACT-1	PT-1	PT-11	PT-1	PT-1	
116	COPY	CPT-1	RB-1	ACT-1	PT-1	PT-11	PT-1	PT-1	
117	SENIOR PLANNER	CPT-1	RB-1	ACT-1	PT-1	PT-11	PT-1	PT-1	
118	HALLWAY		WB-1	PT-2	PT-1	PT-1/ PT-3/FWP-2	PT-1	PT-1/ FWP-1/ WWP-2/FWP-2	E, L, F
120	CONFERENCE ROOM			ACT-1					A
121	VESTIBULE	CPT-3	RB-2	ACT-1	PT-1	PT-1	PT-1	PT-1	
122	MEN'S RESTROOM			PT-2	PT-4	PT-4	PT-4	PT-4	E
123	WOMEN'S RESTROOM			PT-2	PT-4	PT-4	PT-4	PT-4	E
124	CONFERENCE ROOM			ACT-1					A
125	A/V ROOM	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
126	COUNCIL CHAMBERS	CPT-4/ CPT-2	WB-1/ WB-2	PT-2/WCP-2/WCP-3	PT-1/FWP-1	PT-1/WWP-2	FWP-1/WWP-2	PT-1/WWP-2	F
127	ELEVATOR LOBBY		WB-1	PT-2	PT-1	PT-1	PT-1	PT-1	E
128	HALLWAY	CPT-1	WB-1	PT-2	PT-1	PT-1	PT-3	PT-1	F
130	MEN'S RESTROOM	CT-2	CTB-1	PT-2	PT-1	CT-1	PT-1	PT-13	D
133	WOMEN'S RESTROOM	CT-2	CTB-1	PT-2	PT-1	PT-13	PT-1	CT-1	D
134	ECON DEV DIRECTOR	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-12	PT-1	
135	SUPPORT STAFF	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
136	ASST. CITY ADMIN	CPT-1	RB-1	ACT-1	PT-12	PT-1	PT-1	PT-1	
138	HALLWAY	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
140	COPIER	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
141	FILES			ACT-1	PT-1	PT-1	PT-1	PT-1	
142	CLOSET								
143	WORK AREA								
144	CELL								
145	CELL								
146	CASHIER	CPT-1	RB-1	ACT-1/ WCP-1	FWP-1/PT-3	FWP-1/PT-3	FWP-1/PT-3	FWP-1/PT-3	F
148	LUNCH/CONF ROOM			ACT-1					A
149	CHAMBER COMM	CPT-1	RB-1	ACT-1	PT-12	PT-1	PT-1	PT-1	
150	SHOWER ROOM	RF-1	RB-1	PT-2	PT-4	PT-4	PT-4	PT-4	
151	WOMEN'S RESTROOM	RF-1	RB-1	PT-2	PT-4	PT-4	PT-4	PT-4	
152	WOMEN'S LOCKER ROOM	RF-1	RB-1	PT-2	PT-4	PT-4	PT-4	PT-4	
153	JANITOR	RF-1	RB-1	ACT-1					
154	MEN'S RESTROOM	RF-1	RB-1	PT-2	PT-4	PT-4	PT-4	PT-4	
155	MEN'S LOCKER ROOM	RF-1	RB-1	PT-2	PT-4	PT-4	PT-4	PT-4	
156	HR DIRECTOR			ACT-1	PT-1	PT-1	PT-1	PT-12	
157	HR ANALYST			ACT-1	PT-1	PT-1	PT-1	PT-12	
158	COMM COORDINATOR			ACT-1	PT-1	PT-1	PT-12	PT-1	
159	PARKS & REC	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-12	PT-1	
160	PARKS & REC	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-12	PT-1	
161	PARKS & REC	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-12	PT-1	
162	HALLWAY	CPT-1	RB-1	ACT-1	PT-1	PT-1	PT-1	PT-1	
163	NORTH VESTIBULE	WM-1		PT-2					
164	SOUTH VESTIBULE	WM-1		PT-2					

GENERAL NOTES

1. Blank cells in finish schedule indicate existing finishes to remain as-is. Contractor to protect existing finishes during construction
2. Paint trim to match adjacent wall, uno
3. Protect all existing finishes to remain during construction. Any damaged or stained finishes to be replaced by contractor.
4. Match existing wall plaster texture where a wall or room to be modified is mostly existing, uno. At new walls and new rooms where the majority of the wall line is mostly new, provide level 4 smooth
5. New TS-1 transition strip between carpet and other flooring

REMARKS

A. Existing floor finish, wall base and wall paint to remain as-is in this room while new ceiling is installed. Contractor to protect existing finishes and patch and repair as needed to integrate with new work.
B. Existing floor finish to remain while other new finishes are installed. Contractor to protect existing finishes and patch and repair as needed to integrate with new work.
C. Columns to be painted PT-14. Do not install base at columns
D. Prep west wall and install backer board to receive new wall tile finish as scheduled
E. Re-paint existing painted ceiling surfaces
F. See interior elevations

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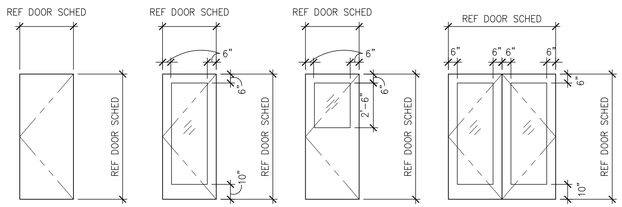
Issue	Revision	Date
100% CD		12/14/18

ROOM FINISH SCHEDULE

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. A701

DOOR TYPES



DOOR SCHEDULE

DOOR#	DOOR TYPE	DOOR MATL	DOOR FINISH	FRAME MATL	FRAME FINISH	DTL	FUNCTION	SIZE	REMARKS
001-A	D1	WD-2	CLR	PFS	PT-20	12/A603	STOREROOM	3-0 x 7-0	H
003-A	D1	WD-2	CLR	PFS	PT-20	12/A603	STOREROOM	3-0 x 7-0	H
004-A	D3	(E)WD		(E)MTL			CLASSROOM		
005-A	D1	(E)WD		(E)MTL			STOREROOM		A
006-A	D3	(E)WD		(E)MTL			CLASSROOM		
007-A	D1	(E)WD		(E)MTL			OFFICE		A
008-A	D1	WD-2	CLR	PFS	PT-20	12/A603	OFFICE	3-0 x 7-0	
011-A	D1	(E)WD		(E)MTL			STOREROOM		A
012-A	D1	(E)MTL		(E)MTL			STOREROOM		A
013-A	D1	(E)MTL		(E)MTL			STOREROOM		A
014-A	D1	(E)WD		(E)MTL					
015-A	D1	(E)MTL		(E)MTL					
016-A	D2	WD-2	CLR	PFS	PT-20	12/A603	OFFICE	3-0 x 7-0	
017-A	D1	(E)WD		(E)MTL					
018-A	D1	(E)WD		(E)MTL					
019-A	D3	(E)WD		(E)MTL					
021-A	D2	(E)WD		(E)MTL					
022-A	D1	(E)WD		(E)MTL					
023-A	D1	(E)WD		(E)WD			STOREROOM		A
023-B	D1	(E)WD		(E)MTL			ENTRY		A
023-C	D1	(E)WD		(E)MTL					
024-A	D1	(E)MTL		(E)MTL			STOREROOM		A
025-A	D1	(E)WD		(E)MTL			STOREROOM		A
027-A	D1	(E)WD		(E)MTL			PASSAGE		A
101-A	D1	(E)WD		(E)WD			OFFICE		A
102-A	D1	(E)WD		(E)WD			OFFICE		A
103-A	D1	(E)WD		(E)WD			OFFICE		A
104-A	D1	(E)WD		(E)WD			OFFICE		A
104-B	D1	(E)WD		(E)WD			OFFICE		A
105-A			PT-1		PT-1				VAULT
106-A	D1	WD-2	CLR	WD	PT-1	1/A603	ENTRY	3-0 x 7-0	G
106-B	D2	WD-2	CLR	WD	PT-3	***	ENTRY	3-0 x 7-0	G, M
108-A	D2	WD-2	CLR	WD	PT-1	1/A603	OFFICE	3-0 x 7-0	
109-A	D1	(E)WD		(E)WD			OFFICE		A
110-A	D1	(E)WD		(E)WD			OFFICE		A
111-A	D2	WD-2	CLR	WD	PT-1	1/A603	ENTRY	3-0 x 7-0	G
112-A	D1	WD-2	CLR	WD	PT-1	1/A603	OFFICE	3-0 x 7-0	B, G
112-B	D2	WD-2	CLR	WD	PT-3	1/A603	OFFICE	3-0 x 7-0	G
113-A	D1	(E)WD		(E)WD			OFFICE		A
114-A	D2	WD-2	CLR	WD	PT-3	1/A603	ENTRY	3-0 x 7-0	G
114-B	D1	WD-2	CLR	WD	PT-1	1/A603	ENTRY	3-0 x 7-0	G
115-A	D1	(E)WD		(E)WD			OFFICE		A
116-A	D1	(E)WD		(E)WD			PASSAGE		A
117-A	D1	(E)WD		(E)WD			OFFICE		A
118-A	D4	(E)MTL		(E)MTL					
118-B	D4	(E)MTL		(E)MTL					

DOOR SCHEDULE (CONT'D)

DOOR#	DOOR TYPE	DOOR MATL	DOOR FINISH	FRAME MATL	FRAME FINISH	DTL	FUNCTION	SIZE	REMARKS
120-A	D3	(E)WD		(E)WD			PASSAGE		A
121-A	D2	WD-2	CLR	WD	PT-3/1	1/A603	ENTRY	3-0 x 7-0	G, J
122-A	D1	(E)WD		(E)WD					
123-A	D1	(E)WD		(E)WD					
124-A	D1	(E)WD		(E)WD			PASSAGE		A
125-A	D1	(E)WD		(E)WD			CLASSROOM		A, C
126-A	D1	WD/PT	CLR/PT	WD	PT-3/1	1/A603	ENTRY	3-0 x 8-0	G, K
126-B	D4	WD-2	CLR	WD	PT-3	1/A603	ENTRY	3-0 x 8-0	G
126-C	D1	WD-2	CLR	WD-2	CLR	***	ENTRY	3-0 x 8-0	
126-D	D1	WD	PT-3	WD	PT-3	***	ENTRY	3-0 x 8-0	D, G, L
127-A	D2	WD-2	CLR	WD	PT-1	1/A603	ENTRY	3-0 x 7-0	G
130-A	D1	WD-2	CLR	WD	PT-1	1/A603	NO LATCH	3-0 x 7-0	E
133-A	D1	WD-2	CLR	WD	PT-1	1/A603	NO LATCH	3-0 x 7-0	E
134-A	D1	(E)WD		(E)WD			OFFICE		A
134-B	D2	(E)MTL		(E)MTL					
135-A	D2	WD-2	CLR	WD	PT-1	1/A603	ENTRY	3-0 x 7-0	G
136-A	D1	(E)WD		(E)WD			OFFICE		A
138-A	D1	(E)MTL	PT-1	(E)MTL	PT-1		ENTRY		F
140-A	D1	(E)WD		(E)WD			STOREROOM		A
141-A	D1	(E)MTL	PT-1	(E)MTL	PT-1		STOREROOM		A
143-A	D1	(E)MTL	PT-1	(E)MTL	PT-1		STOREROOM		A
143-B	D1	(E)MTL	PT-1	(E)MTL	PT-1		STOREROOM		F
148-A	D1	(E)WD		(E)WD			NO LATCH		
148-B	D1	(E)WD		(E)WD			NO LATCH		
149-A	D1	(E)WD		(E)WD			OFFICE		A
151-A	D1	(E)WD		(E)WD			NO LATCH		
152-A	D1	(E)WD		(E)WD			NO LATCH		
153-A	D1	(E)WD		(E)WD			STOREROOM		A
154-A	D1	(E)WD		(E)WD			NO LATCH		
155-A	D1	(E)WD		(E)WD			NO LATCH		
156-A	D1	(E)WD		(E)WD			OFFICE		A
157-A	D1	(E)WD		(E)WD			OFFICE		A
158-A	D1	(E)WD		(E)WD			OFFICE		A
159-A	D2	WD-1	CLR	WD-1	CLR		OFFICE	3-0 x 7-0	
160-A	D2	WD-1	CLR	WD-1	CLR		OFFICE	3-0 x 7-0	
161-A	D2	WD-1	CLR	WD-1	CLR		OFFICE	3-0 x 7-0	
162-A	D2	WD-2	CLR	WD	PT-3	1/A603	ENTRY	3-0 x 7-0	G
163-A	D4	(E)MTL		(E)MTL					
164-A	D4	(E)MTL		(E)MTL					

ABBREVIATIONS

(E)	EXISTING
CLR	CLEAR
HM	HOLLOW METAL
PFS	PREFINISHED STEEL (KNOCKDOWN FRAME)
MTL	METAL
PT	PAINT
WD	WOOD
FWP	FABRIC WALL PANEL

NOTES

1. BLANK FIELDS IN DOOR SCHEDULE INDICATE EXISTING TO REMAIN, UNO.
2. VERIFY ALL CHARACTERISTICS OF EXISTING DOORS AND CONFIRM ACCEPTABILITY WITH OWNER.
3. WHERE NEW FRAMES ARE SCHEDULED, ALTER FRAMING OF EXISTING OPENING TO FIT NEW DOOR AND FRAME SIZE
4. VERIFY ALL DOOR SIZES IN FIELD BEFORE FABRICATION OR ORDERING
5. SEE MATERIAL & FINISH LEGEND FOR FINISHES
6. PROVIDE NEW HARDWARE AT ALL NEW DOORS, REFERENCE PROJECT MANUAL FOR HARDWARE SETS AND SPECIFICATIONS
7. ALL EXISTING PAINTED DOORS TO BE REPAINTED
8. EXISTING DOOR HARDWARE TO REMAIN IN PLACE, UNO
9. PROVIDE TEMPERED GLAZING WHERE REQUIRED BY CODE

REMARKS

A. PROVIDE NEW ADA COMPLIANT HANDSET, STRIKE PLATE AND HINGES AT EXISTING DOOR, ALL OTHER EXISTING HARDWARE TO REMAIN AS-IS

B. DOOR INTENDED FOR ESCAPE FUNCTION FROM OFFICE; TO BE SECURED FROM BOTH SIDES AND ONLY OPERABLE VIA ACCESS CONTROL DEVICE

C. EXISTING DOOR EQUIPPED WITH VENT

D. BLIND DOOR, SEE INTERIOR ELEVATIONS. SECURED FROM COUNCIL CHAMBERS SIDE OF DOOR

E. PROVIDE PUSH/PULL PLATES AND KICK PLATES

F. EXISTING EXTERIOR DOOR, PAINT INTERIOR SURFACES ONLY

G. ACCESS CONTROLLED DOOR, PROVIDE ELECTRIC STRIKE AND POWER. CARD/PROX READER BY OWNER'S ACCESS CONTROL SUPPLIER.

H. PROVIDE 3/4" UNDERCUT AT DOOR TO FACILITATE RETURN AIR

J. PROVIDE PT-3 ON HALLWAY 118 SIDE, PT-1 ON OTHER SIDE

K. DOOR TO BE WD-2 ON HALL SIDE, PT-1 ON COUNCIL SIDE, FRAME TO BE PT-3 ON HALL SIDE, PT-1 ON COUNCIL SIDE

L. DOOR HAS CUSTOM FINISH MATERIAL ON COUNCIL SIDE, REFERENCE ELEVATIONS AND DETAILS

M. PROVIDE TEMPERED DECORATIVE GLASS AT GLAZING, SEE SPEC

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270 Montgomery St.
Woodburn, OR 97071

Issue	Revision	Date
100% CD		12/14/18

DOOR SCHEDULE

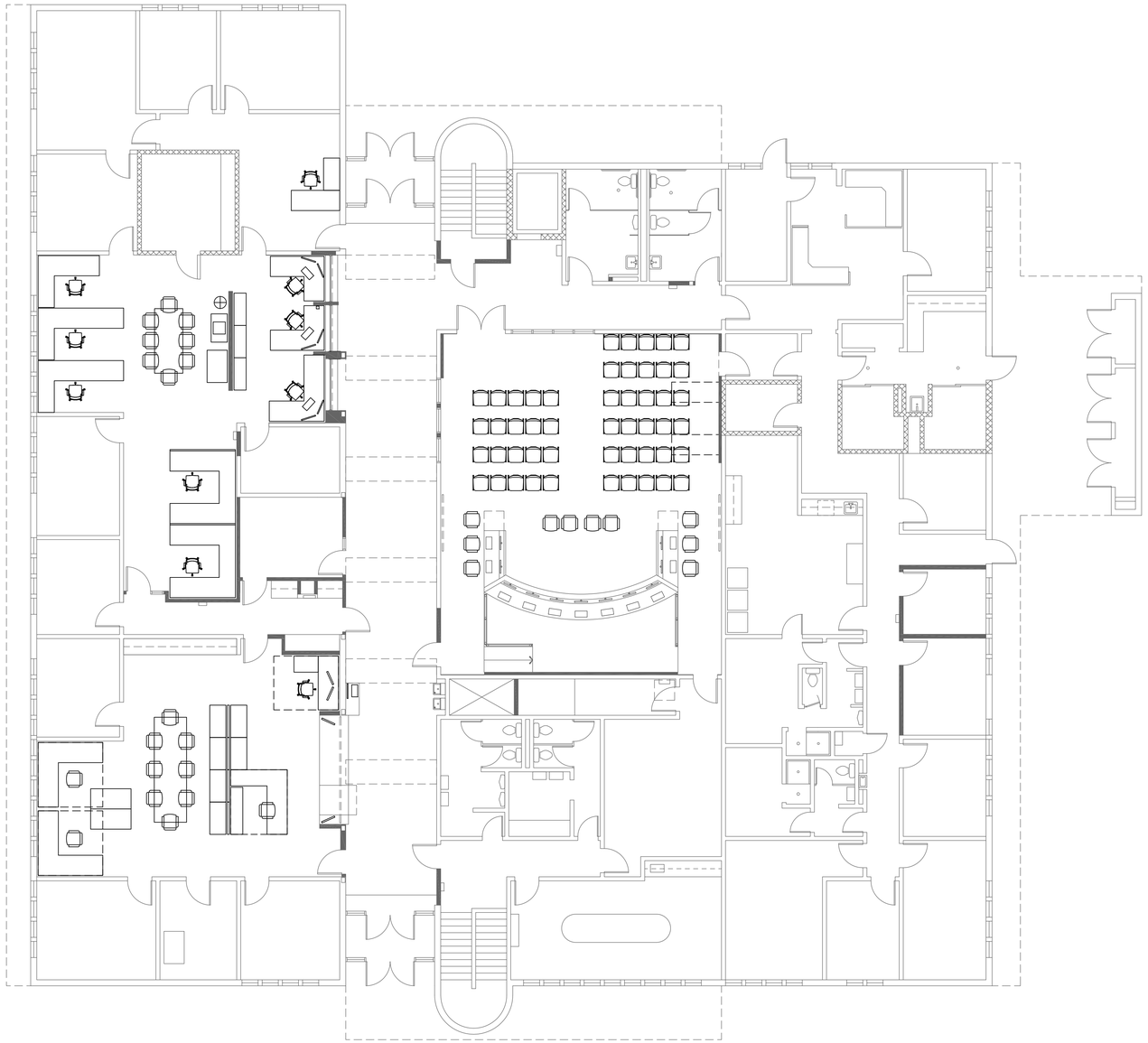
Scale 1/8" = 1'-0"

Date DECEMBER 14, 2018

Sheet No. A702

NOTES THIS SHEET

1. FURNITURE SHOWN IN BLACK, FOR REFERENCE ONLY
2. FURNITURE ITEMS ARE OFOI, UNO



1 FURNITURE PLAN - GROUND LEVEL (FOR REFERENCE ONLY)
SCALE: 1/8" = 1'-0"

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FURNITURE PLAN GROUND LEVEL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. F101

DRAWING INDEX

ABBREVIATIONS

A.B.	ANCHOR BOLT
ACI	AMERICAN CONCRETE INSTITUTE
ADD'L.	ADDITIONAL
AESS	ARCHITECTURAL EXPOSED STRUCTURAL STEEL
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION INCORPORATED
ALT.	ALTERNATE
ALUM.	ALUMINUM
APA	AMERICAN PLYWOOD ASSOCIATION
ARCH.	ARCHITECT
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
BLDG.	BUILDING
BOT.	BOTTOM
BRBF	BUCKLING RESTRAINED BRACED FRAME
C.G.	CENTER OF GRAVITY
C.I.P.	CAST IN PLACE
C.J.	CONTROL JOINT
C.J.P.	COMPLETE JOINT PENETRATION
CL	CENTERLINE
CLR.	CLEAR
CMU	CONCRETE MASONRY UNIT
COL.	COLUMN
CONC.	CONCRETE
CONN.	CONNECTION
CONST.	CONSTRUCTION
CONT.	CONTINUOUS
d_b	BAR DIAMETER
DBA	DEFORMED BAR ANCHOR
DET.	DETAIL
DIA., Ø	DIAMETER
DIAG.	DIAGONAL
D.L.	DEAD LOAD
DWG.	DRAWING
ELEC.	ELECTRICAL
EL.	ELEVATION
EQ.	EQUAL
EXIST., (E)	EXISTING
EXP.	EXPANSION
EXT.	EXTERIOR
FDN.	FOUNDATION
FIN.	FINISH
FLR.	FLOOR
FT.	FOOT
FTG.	FOOTING
GA.	GAUGE
GALV.	GALVANIZED
GL	GLULAM
HORIZ.	HORIZONTAL
HSS	HOLLOW STRUCTURAL SECTION
IBC	INTERNATIONAL BUILDING CODE
ICBO	INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS
ICC	INTERNATIONAL CODE COUNCIL
I.D.	INSIDE DIAMETER
IN.	INCH
INT.	INTERIOR
K	KIPS
KSF	KIPS PER SQUARE FOOT
KSI	KIPS PER SQUARE INCH
LBS.	POUND
L.L.	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LOC.	LOCATION
LONG.	LONGITUDINAL
LVF	LOW VELOCITY FASTENER
MAX.	MAXIMUM
MBMA	METAL BUILDING MANUFACTURERS ASSOCIATION
MECH.	MECHANICAL
MFR.	MANUFACTURER
MIN.	MINIMUM
MISC.	MISCELLANEOUS
MPH	MILES PER HOUR
MT	MAGNETIC PARTICLE TESTING
(N)	NEW
N.I.C.	NOT IN CONTRACT
NOM.	NOMINAL
NO.	NUMBER
N.T.S.	NOT TO SCALE
o.c.	ON CENTER
O.D.	OUTSIDE DIAMETER
OPP.	OPPOSITE
OWJ	OPEN WEB JOIST
PAF	POWDER ACTUATED FASTENER
PART.	PARTITION
P/C	PRECAST
PCF	POUNDS PER CUBIC FOOT
PL	PLATE
P.P.	PARTIAL PENETRATION
PSI	POUNDS PER SQUARE INCH
P/T	POST-TENSIONED
P.T.	PRESSURE TREATED
PVC	POLYVINYL CHLORIDE
R, RAD.	RADIUS
RCSC	RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS
REF.	REFERENCE
RET.	RETURN
REINF.	REINFORCING
REQ'D.	REQUIRED
REQ'MTS.	REQUIREMENTS
SCHED.	SCHEDULE
S.C.	SLIP CRITICAL
SIM.	SIMILAR
SLRS	SEISMIC LOAD RESISTING SYSTEM
S.O.G.	SLAB ON GRADE
SPEC.	SPECIFICATION
SQ.	SQUARE
SS	STAINLESS STEEL
SSMA	STEEL STUD MANUFACTURERS ASSOCIATION
STD.	STANDARD
STRUCT.	STRUCTURAL
SYM.	SYMMETRICAL
THRU	THROUGH
T&G	TONGUE AND GROOVE
TJ	TRUSS JOIST
TRANS.	TRANSVERSE
TS	LIGHT GAUGE TUBE STEEL
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
UT	ULTRASONIC TESTING
VERT.	VERTICAL
V.I.F.	VERIFY IN FIELD
w/	WITH
WF	WIDE FLANGE
w/o	WITHOUT
W.P.	WORK POINT
WPS	WELDING PROCEDURE SPECIFICATION
WWF	WELDED WIRE FABRIC

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Issue	Revision	Date
100% CD		12/14/18

Scale AS NOTED

Date DECEMBER 14, 2018

Sheet No. S001

GENERAL STRUCTURAL NOTES

STRUCTURAL DRAWINGS ARE A PORTION OF THE CONTRACT DOCUMENTS AND ARE INTENDED TO BE USED WITH ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE REQUIREMENTS FROM THESE DRAWINGS INTO THEIR SHOP DRAWINGS AND WORK.

THESE GENERAL NOTES SUPPLEMENT THE PROJECT SPECIFICATIONS. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. NOTES AND DETAILS ON THE STRUCTURAL DRAWINGS SHALL TAKE PRECEDENCE OVER THE GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE GIVEN, CONSTRUCTION SHALL BE AS SHOWN FOR SIMILAR WORK.

CODE REQUIREMENTS:

CONFORM TO THE 2014 OREGON STRUCTURAL SPECIALTY CODE (OSSC), BASED ON THE 2012 INTERNATIONAL BUILDING CODE (IBC).

TEMPORARY CONDITIONS:

THE STRUCTURE IS DESIGNED TO FUNCTION AS A UNIT UPON COMPLETION. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL TEMPORARY BRACING AND/OR SUPPORT THAT MAY BE REQUIRED AS THE RESULT OF THE CONTRACTOR'S CONSTRUCTION METHODS AND/OR SEQUENCES.

EXISTING CONDITIONS:

ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS SHALL BE FIELD VERIFIED. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY SIGNIFICANT DISCREPANCIES FROM CONDITIONS SHOWN ON THE DRAWINGS.

ASSUMED FUTURE CONSTRUCTION:

VERTICAL: NONE
HORIZONTAL: NONE

DESIGN CRITERIA:

DESIGN WAS BASED ON THE STRENGTH AND DEFLECTION CRITERIA OF THE OSSC. IN ADDITION TO THE DEAD LOADS, THE FOLLOWING LOADS AND ALLOWABLES WERE USED FOR DESIGN:

DESIGN CRITERIA		
GRAVITY SYSTEM CRITERIA		
ROOF LIVE/SNOW LOAD	25 PSF L.L. (ALSO SEE SNOW LOAD CRITERIA BELOW)	
SNOW CRITERIA		
DESIGN ROOF SNOW LOAD	25 PSF MINIMUM IN ACCORDANCE WITH OSSC	
GEOTECHNICAL CRITERIA		
DESIGN BASED ON REPORT BY:	OSSC TABLE 1806.2	
ALLOWABLE SOIL PRESSURE:	1,500 PSF	
SHORT TERM LOADING:	1,500 PSF	
PASSIVE EARTH PRESSURE:	100 PCF	
WIND CRITERIA		
RISK CATEGORY	II	
MAIN WIND FORCE RESISTING SYSTEM	Vult = 130 MPH ULTIMATE DESIGN WIND SPEED (3-SECOND GUST)	
COMPONENTS AND CLADDINGS	Vult = 130 MPH ULTIMATE DESIGN WIND SPEED (3-SECOND GUST)	
EXPOSURE CATEGORY	B	
GUST/INTERNAL PRESSURE	GCpi = +/- 0.18	
SEISMIC CRITERIA		
RISK CATEGORY	II	
SEISMIC DESIGN CATEGORY	D	
SITE CLASS	D	
IMPORTANCE FACTOR	IE = 1.0	
MCE SPECTRAL ACCELERATION	Ss = 0.952	S1 = 0.430
SITE COEFFICIENT	Fa = 1.01	Fv = 1.45
DESIGN SPECTRAL ACCELERATION	SDS = 0.710	SD1 = 0.450
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE PER ASCE 7-10, SECTION 12.8	
	X DIRECTION (E / W)	Y DIRECTION (N / S)
SEISMIC FORCE RESISTING SYSTEM (SFRS)	LIGHT FRAMED WALLS	LIGHT FRAMED WALLS
RESPONSE MODIFICATION FACTOR	R = 6.5	R = 6.5
SEISMIC RESPONSE COEFFICIENT	Cs = 0.178	Cs = 0.178

SEISMIC FORCE-RESISTING SYSTEM:

THE SEISMIC FORCE-RESISTING SYSTEM (SFRS) FOR THE EXISTING STRUCTURE IS AS FOLLOWS:

WOOD ROOF AND FLOOR DIAPHRAGMS TRANSFER LATERAL LOADS TO WOOD AND GYPBOARD SHEAR WALLS AND CONCRETE FOUNDATIONS.

VOLUNTARY SEISMIC STRENGTHENING CONSISTS OF REPLACING SOME EXISTING GYPBOARD SHEAR WALLS WITH PLYWOOD SHEAR WALLS. NOT ALL GYPBOARD SHEAR WALLS WERE STRENGTHENED.

STRUCTURAL OBSERVATION:

THE STRUCTURAL ENGINEER OF RECORD (SER) WILL PERFORM STRUCTURAL OBSERVATION BASED ON THE REQUIREMENTS OF THE OSSC AT THE STAGES OF CONSTRUCTION LISTED BELOW. CONTRACTOR SHALL PROVIDE SUFFICIENT NOTICE AND ACCESS FOR THE SER TO PERFORM THESE OBSERVATIONS.

STRUCTURAL OBSERVATIONS			
ITEM	**OBSERVED BY (2)**		**COMMENTS**
	AOR	**SER**	
PRIOR TO FIRST CONCRETE POUR		X	REF. NOTES 1,3,4,5
AS REQUIRED TO ADDRESS STRUCTURAL ISSUES		X	REF. NOTES 1,3,4

FOOTNOTES:

1. CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE SER IN ADVANCE.
2. SER - STRUCTURAL ENGINEER OF RECORD.
   AOR - ARCHITECT OF RECORD.
3. A FIELD REPORT WILL BE SUBMITTED TO THE BUILDING DEPARTMENT FOLLOWING EACH SITE VISIT.
4. STRUCTURAL OBSERVATION IS FOR THE GENERAL CONFORMANCE OF THE STRUCTURAL DRAWING, SPECIAL INSPECTION IS STILL REQUIRED.
5. AFTER REINFORCING STEEL HAS BEEN INSTALLED.

SPECIAL INSPECTION AND TESTING:

SPECIAL INSPECTION WILL BE PROVIDED BY THE OWNER BASED ON THE REQUIREMENTS OF CHAPTER 17 OF THE OSSC AND THE BUILDING OFFICIAL. CONTRACTOR SHALL PROVIDE SUFFICIENT NOTICE AND ACCESS FOR THE SPECIAL INSPECTOR TO PERFORM THESE INSPECTIONS.

SUBMITTALS:

SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FABRICATION AND CONSTRUCTION OF ALL STRUCTURAL ITEMS, INCLUDING THE FOLLOWING:

SUBMITTALS			
ITEM	**SUBMITTAL (1,4)**	**DEFERRED SUBMITTAL (2,4)**	**COMMENTS**
CONCRETE MIX DESIGNS	X		
CONCRETE REINFORCEMENT	X		
CONCRETE ANCHORAGES	X		
EMBEDDED STEEL ITEMS	X		
STRUCTURAL STEEL	X		
STEEL WELDING PROCEDURES	X		
STEEL FASTENERS	X		
MEP EQUIPMENT ANCHORAGE AND BRACING		X	REF. NOTES

FOOTNOTES:

1. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FABRICATION AND CONSTRUCTION OF STRUCTURAL ITEMS. IF THE SHOP DRAWINGS DIFFER FROM OR ADD TO THE DESIGN OF THE STRUCTURAL DRAWINGS, THEY SHALL BEAR THE SEAL AND SIGNATURE OF A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF OREGON. ANY CHANGES TO THE STRUCTURAL DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT AND ARE SUBJECT TO REVIEW AND ACCEPTANCE OF THE STRUCTURAL ENGINEER.
2. DESIGN DRAWINGS, SHOP DRAWINGS, AND CALCULATIONS FOR THE DESIGN AND FABRICATION OF ITEMS THAT ARE DESIGNED BY OTHERS SHALL BEAR THE SEAL AND SIGNATURE OF A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF OREGON, AND SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FABRICATION. CALCULATIONS SHALL BE INCLUDED FOR ALL CONNECTIONS TO THE STRUCTURE, CONSIDERING LOCALIZED EFFECTS ON STRUCTURAL ELEMENTS INDUCED BY THE CONNECTION LOADS. DESIGN SHALL BE BASED ON THE REQUIREMENTS OF THE OSSC AND AS NOTED UNDER "DESIGN CRITERIA".
3. THE CONTRACTOR SHALL COORDINATE SEISMIC RESTRAINTS OF MECHANICAL, PLUMBING, AND ELECTRICAL EQUIPMENT, MACHINERY, AND ASSOCIATED PIPING WITH THE STRUCTURE. CONNECTIONS TO STRUCTURE SHALL CONFORM TO ASCE 7-10 CHAPTER 13, BE DESIGNED BY AN ENGINEER REGISTERED IN THE STATE OF OREGON, AND SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FABRICATION.
4. FIELD ENGINEERED DETAILS DEVELOPED BY THE CONTRACTOR THAT DIFFER FROM OR ADD TO THE STRUCTURAL DRAWINGS SHALL BEAR THE SEAL AND SIGNATURE OF A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF OREGON AND SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO CONSTRUCTION.
5. THE USE OF REPRODUCTIONS OR PHOTOCOPIES OF THE CONTRACT DRAWINGS SHALL NOT BE PERMITTED. WHEN CAD OR REVIT FILES ARE PROVIDED TO THE CONTRACTOR OR SUBCONTRACTORS, IT IS THE RESPONSIBILITY OF THE DETAILERS TO REMOVE ALL INFORMATION NOT DIRECTLY RELEVANT TO THE CREATION OF THE PLACING DRAWINGS AS WELL AS ALL REFERENCES TO THE OUTSIDE SOURCE FILES.

CONCRETE:

CONCRETE WORK SHALL CONFORM TO CHAPTER 19 OF THE OSSC. CONCRETE STRENGTHS SHALL BE VERIFIED BY STANDARD CYLINDER TESTS PER ASTM C39. MIX DESIGNS SHALL BE AS FOLLOWS:

CONCRETE MIX DESIGNS				
USE	f'c (PSI)	TEST AGE (DAYS)	MAX. W/CM RATIO (NOTE 1)	MAX. AGGREGATE SIZE
FOUNDATIONS AND SLAB POURBACKS	3,000	28	0.50	3/4"

TABLES NOTES:

1. VERIFY WATER-CEMENTITIOUS MATERIAL RATIO WITH FLOOR COVERING MANUFACTURER FOR CONCRETE FLOORS WITH MOISTURE SENSITIVE FLOOR COVERINGS.
2. ESTABLISH WATER-CEMENTITIOUS MATERIAL RATIO PER ACI 318-11 CHAPTER 5.

PORTLAND CEMENT CONTENT MAY BE REPLACED UP TO 20% WITH FLY ASH CONFORMING TO ASTM C618 (INCLUDING TABLE 2A) TYPE F OR TYPE C OR UP TO 50% WITH SLAG CEMENT CONFORMING TO ASTM C989, PROVIDED THAT THE MIX STRENGTH IS SUBSTANTIATED BY TEST DATA. FOR MIX DESIGNS WITH f'c = 5,000 PSI OR LESS, SLAG CEMENT MAY BE SUBSTITUTED FOR FLY ASH AT A 1:1 RATIO WITHOUT TEST DATA. WHEN SLAG CEMENT IS SUBSTITUTED IN HIGHER STRENGTH MIXES OR AT DIFFERENT RATIO, THE MIX STRENGTH MUST BE SUBSTANTIATED BY TEST DATA.

A WATER-REDUCING ADMIXTURE CONFORMING TO ASTM C494 USED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS SHALL BE INCORPORATED IN CONCRETE DESIGN MIXES. A HIGH-RANGE WATER-REDUCING (HRWR) ADMIXTURE CONFORMING TO ASTM C494 TYPE F OR G MAY BE USED IN CONCRETE MIXES PROVIDING THAT THE SLUMP DOES NOT EXCEED 10". AN AIR-ENTRAINING AGENT CONFORMING TO ASTM C260 SHALL BE USED IN CONCRETE MIXES FOR ALL CONCRETE EXPOSED TO WEATHER. THE AMOUNT OF ENTRAINED AIR BY VOLUME SHALL BE A 5 ± 1.5%:

THE CONTRACTOR SHALL SUBMIT CONCRETE MIX DESIGNS ALONG WITH TEST DATA COMPLIANT WITH ACI 318-11 OSSC SECTION 1905 A MINIMUM OF TWO WEEKS PRIOR TO PLACING CONCRETE. NO WATER MAY BE ADDED TO CONCRETE IN THE FIELD UNLESS SPECIFICALLY APPROVED IN WRITING BY THE CONCRETE SUPPLIER IN CONJUNCTION WITH THE CONCRETE MIX DESIGN.

WHERE NEW CONCRETE IS PLACED AGAINST EXISTING CONCRETE, THE EXISTING CONCRETE SURFACE SHALL BE CLEANED AND ROUGHENED TO A MINIMUM 1/4" AMPLITUDE PER ACI 318 SECTION 11.6.9. PROVIDE 3/4" CHAMFERS ON ALL EXPOSED CONCRETE EDGES, UNLESS NOTED OTHERWISE.

VERIFY ALL BLOCK OUTS WITH ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING REQUIREMENTS.

REINFORCING STEEL:

ALL DEFORMED BAR REINFORCEMENT MAY BE ASTM A615 GRADE 60 OR ASTM A706 GRADE 60. ASTM A615 REINFORCEMENT MAY BE SUBSTITUTED FOR ASTM A706 REINFORCEMENT PROVIDED THAT THE ACTUAL YIELD STRENGTH BASED ON MILL TESTS DOES NOT EXCEED 78,000 PSI AND THE RATIO OF ACTUAL TENSILE STRENGTH TO ACTUAL YIELD STRENGTH IS NOT LESS THAN 1.25. MILL TESTS CERTIFICATIONS FOR SUBSTITUTED BARS SHALL BE SUBMITTED TO THE SPECIAL INSPECTOR AND EOR PRIOR TO PLACEMENT.

BARS IN SLABS SHALL BE SUPPORTED ON WELL-CURED CONCRETE BLOCKS OR APPROVED METAL OR PLASTIC CHAIRS, AS SPECIFIED BY THE CRSI MANUAL OF STANDARD PRACTICE, MSP-1. REINFORCING STEEL SHALL BE DETAILED IN ACCORDANCE WITH THE "ACI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES," ACI 315. SHOP DRAWINGS SHALL INCLUDE ELEVATIONS OF ALL BEAMS, WALLS AND COLUMNS SHOWING BAR LOCATIONS. LAP ALL REINFORCING BARS PER THE TYPICAL LAP SPLICE LENGTH SCHEDULES, EXCEPT AS NOTED ON DRAWINGS. USE LAP LENGTH FOR SMALLER BAR WHEN SPLICING DIFFERENT BAR SIZES. BARS SPLICED WITH NONCONTACT LAPS SHALL BE SPACED NO FARTHER THAN 1/5TH THE LAP LENGTH OR 6 INCHES. MECHANICAL SPLICES NOTED ON THE PLANS SHALL BE DAYTON SUPERIOR BAR-LOCK (ICC ESR-2495) OR TAPER-LOCK COUPLERS (IAPMO ES-0319) OR APPROVED WITH A CURRENT EVALUATION APPROVAL REPORT.

TYP. FOUNDATION AND STEM WALL LAP SPLICE LENGTH SCHEDULE (IN.)	
BAR SIZE	f'c = 3,000 PSI
#3	14
#4	20
#5	24

TABLE NOTES:

1. ASTM A615 OR ASTM A706, GRADE 60 DEFORMED REINFORCING BARS
2. MINIMUM CLEAR COVER AND BAR SPACING of 4db TO BE PROVIDED.
3. NORMAL WEIGHT CONCRETE, FOR LIGHT-WEIGHT CONCRETE MULTIPLY TABLE VALUES BY 1.3.
4. UNCOATED BARS, FOR EPOXY-COATED BARS MULTIPLY TABLE VALUES BY 1.5.
5. COMBINATIONS OF EFFECTS DUE TO CONCRETE STRENGTH, CONCRETE WEIGHT, AND EPOXY COATING ARE CUMULATIVE.

REINFORCING STEEL SHALL HAVE PROTECTION AS FOLLOWS:

REINFORCING STEEL CONCRETE COVER	
USE	**CLEAR COVER**
SLABS	1-1/2"
WALLS: EXPOSED TO EARTH OR WEATHER	1-1/2" (#5 AND SMALLER)
	2" (#6 AND LARGER)
CONCRETE CAST AGAINST AND EXPOSED TO EARTH	3"

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GENERAL STRUCTURAL NOTES CONT.

POST-INSTALLED ANCHORS SHALL BE OF THE TYPE AND PRODUCT SPECIFIED ON THE DRAWINGS OR AS FOLLOWS:

POST INSTALLED CONCRETE ANCHORS	
TYPE	**APPROVED ANCHORS**
EXPANSION	HILTI KWIK BOLT TZ (ICC ESR-1917) SIMPSON STRONG-BOLT 2 (ICC ESR-3037) DEWALT POWER-STUD+ (ICC ESR-2502)
CONCRETE SCREW	HILTI KWIK HUS-EZ (ICC ESR-3027) SIMPSON TITEN HD (ICC ESR-2713) DEWALT SCREW-BOLT+ (ICC ESR-3889)
EPOXY ADHESIVE	HILTI HIT-HY 200 (ICC ESR-3187) HILTI HIT-RE 500 V3 (ICC ESR-3814) SIMPSON SET-XP (ICC ESR-2508) DEWALT PURE110+ (ICC ESR-3298)

ALL ANCHORS SHALL BE INSTALLED IN STRICT CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND PRODUCT EVALUATION REPORTS. EMBEDMENTS SPECIFIED ON DRAWINGS ARE "EFFECTIVE" EMBEDMENTS. REFERENCE MANUFACTURER LITERATURE FOR CORRESPONDING ACTUAL EMBEDMENT DEPTHS.

REQUESTS FOR ANCHOR SUBSTITUTIONS SHALL BE SUBMITTED TO THE EOR IN WRITING ALONG WITH EVIDENCE OF EQUAL OR GREATER CAPACITY TO THE SPECIFIED CONNECTION. DO NOT CUT REINFORCING IN NEW OR EXISTING CONCRETE DURING INSTALLATION.

INSTALLATION OF ADHESIVE ANCHORS HORIZONTALLY OR UPWARDLY INCLINED SHALL BE PERFORMED BY A CERTIFIED ADHESIVE ANCHOR INSTALLER AS CERTIFIED THROUGH ACI/CRSI AND IN ACCORDANCE WITH ACI 318-11 SECTION D.9.2.2. PROOF OF CURRENT CERTIFICATION SHALL BE SUBMITTED TO THE EOR PRIOR TO INSTALLATION.

ANCHORS EXPOSED TO EARTH OR WEATHER SHALL BE PROTECTED FROM CORROSION BY HOT-DIP GALVANIZING OR USE OF STAINLESS STEEL. PERMANENTLY EXPOSED EMBEDDED PLATES AND ANGLES SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION, UNLESS NOTED OTHERWISE.

NO LOADS OR WELDS SHALL BE PLACED ON EMBEDDED PLATES OR ANGLES FOR A MINIMUM OF 7 DAYS AFTER CASTING. IN ACCORDANCE WITH ACI 318-11 SECTION D.2.2 ADHESIVE ANCHORS SHALL NOT BE INSTALLED FOR A MINIMUM OF 21 DAYS AFTER CASTING.

STRUCTURAL STEEL:

STRUCTURAL STEEL SHALL BE:

STRUCTURAL STEEL	
MATERIAL GRADE	**SHAPE**
ASTM A36	CHANNELS, PLATES AND ANGLES, EXCEPT AS NOTED
ASTM A500, GRADE B (FY=46KSI)	HOLLOW STRUCTURAL SECTIONS (TUBES)

DESIGN, FABRICATION, AND ERECTION SHALL BE IN ACCORDANCE WITH THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" WITH "COMMENTARY" AND THE "CODE OF STANDARD PRACTICE", WITH EXCEPTIONS NOTED IN SPECIFICATIONS.

BOLTS SHALL CONFORM TO THE ASTM AND RCSC SPECIFICATIONS FOR JOINTS USING A307 OR A490 HIGH STRENGTH BOLTS. BOLTS SHALL BE SNUG-TIGHT UNLESS NOTED OTHERWISE.

WELDING SHALL CONFORM TO THE AWS CODES FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH A WELDED PROCEDURE SPECIFICATION (WPS) AS REQUIRED IN AWS D1.1 AND APPROVED BY THE STRUCTURAL ENGINEER. THE WPS VARIABLES SHALL BE WITHIN THE PARAMETERS ESTABLISHED BY THE FILLER-METAL MANUFACTURER.

WELDS SHALL BE MADE USING E70XX ELECTRODES AND SHALL BE 3/16" MINIMUM, UNLESS OTHERWISE NOTED. WELDING SHALL BE BY AWS CERTIFIED WELDERS.

SAWN LUMBER:

SAWN LUMBER SHALL CONFORM TO THE REQUIREMENTS AS INDICATED IN THE CURRENTLY ACCEPTED NATIONAL DESIGN SPECIFICATION (NDS) DESIGN VALUES FOR WOOD CONSTRUCTION AND CONFORMING TO THE WEST COAST LUMBER INSPECTION BUREAU OR WESTERN WOOD PRODUCTS ASSOCIATION GRADING RULES. LUMBER SHALL BE THE SPECIES, GRADE, AND MOISTURE CONTENT NOTED BELOW:

SAWN LUMBER		
USE	**SPECIES AND GRADE**	**MOISTURE CONTENT**
LUMBER 2" TO 4" THICK x 5" OR WIDER (JOISTS/RAFTERS)	DOUGLAS FIR-LARCH NO. 2 & BTR	MC/KD 15
LUMBER 2" TO 3" THICK x 4" TO 6" WIDE (STUDS)	DOUGLAS FIR-LARCH NO. 2	MC/KD 15
LUMBER 5x5 AND GREATER (BEAMS)	DOUGLAS FIR-LARCH NO. 1	S-DRY
LUMBER 5x5 AND GREATER (POSTS)	DOUGLAS FIR-LARCH NO. 1	S-DRY

ALL LUMBER IN CONTACT WITH CONCRETE OR CMU SHALL BE PRESSURE TREATED, UNLESS AN APPROVED MOISTURE BARRIER IS PROVIDED.

FRAMING ACCESSORIES SHALL BE MANUFACTURED BY SIMPSON STRONG TIE (OR APPROVED EQUAL) AND OF THE SIZE AND TYPE SHOWN ON THE DRAWINGS. ALL NAIL HOLES SHALL BE FILLED WITH STRUCTURAL FASTENERS, UNLESS NOTED OTHERWISE ON THE DRAWINGS AND FASTENERS SHALL BE INSTALLED FOLLOWING ALL MANUFACTURERS REQUIREMENTS. IF A SUBSTITUTION IS MADE, A DOCUMENT SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL OUTLINING THE FRAMING ACCESSORIES BEING REPLACED AND THE SUBSTITUTED FRAMING ACCESSORIES. ALLOWABLE LOADS FOR THE SIMPSON ACCESSORIES SHALL BE TABULATED ALONG WITH ALLOWABLE LOADS FOR THE SUBSTITUTED ACCESSORIES, WHICH CLEARLY INDICATE THE SUBSTITUTED ACCESSORIES HAVING AN EQUAL OR GREATER CAPACITY.

ALL FRAMING NAILS SHALL BE OF THE SIZE AND QUANTITY INDICATED ON THE DRAWINGS AND CONFORM TO ASTM F 1667, "STANDARD SPECIFICATION OF DRIVEN FASTENERS: NAILS, SPIKES, AND STAPLES AND ICC-ES REPORT ESR-1539 "POWER-DRIVEN STAPLES AND NAILS". NAILS SHALL BE IDENTIFIED BY LABELS (ATTACHED TO THEIR CONTAINERS) THAT SHOW THE MANUFACTURER'S NAME AND ICC-ES REPORT NUMBER, NAIL SHANK DIAMETER, AND LENGTH AND SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FRAMING. NAILING NOT SHOWN SHALL BE AS INDICATED ON OSSC TABLE 2304.9.1 OR ESR-1539. THE FOLLOWING NAIL SIZES SHALL BE USED WITH THE NAIL LENGTH DETERMINED BY MINIMUM PENETRATION INTO FRAMING MEMBER:

FRAMING NAILS		
NAIL TYPE	**SHANK DIAMETER (IN.)**	**MINIMUM PENETRATION INTO FRAMING MEMBER (IN.)**
6d	0.113	1.125
8d	0.131	1.375
10d	0.148	1.5
12d	0.148	1.5
16d	0.162	1.625

BOLTS AND LAG SCREWS SHALL CONFORM TO ANSI/ASME STANDARD B18.2.1. ALL BOLTS AND LAG SCREWS SHALL BE INSTALLED WITH STANDARD CUT WASHERS.

CUTTING AND NOTCHING OF JOISTS AND STUDS SHALL CONFORM TO THE TYPICAL WOOD DETAILS PROVIDED OR OSSC SECTIONS 2308.4.2.4, 2308.5.9 AND 2308.7.4 WHERE NO DETAILS ARE SPECIFIED.

WOOD STRUCTURAL PANELS:

THE TERM "WOOD STRUCTURAL PANEL" REFERS TO A WOOD-BASED PANEL PRODUCT BONDED WITH A WATERPROOF ADHESIVE. INCLUDED UNDER THIS DESIGNATION ARE BOTH PLYWOOD AND ORIENTED STRAND BOARD (OSB). WOOD STRUCTURAL PANELS SHALL CONFORM TO U.S. DEPARTMENT OF COMMERCE VOLUNTARY PRODUCT STANDARDS PS1 OR PS2 FOR WOOD-BASED STRUCTURAL USE PANELS, OR APA PERFORMANCE STANDARD PRP-108 (ICC-ES ESR-2586). PANELS SHALL BE APA RATED SHEATHING OR APA RATED STURD-I-FLOOR, EXTERIOR OR EXPOSURE 1, OF THE THICKNESS AND SPAN RATING SHOWN ON THE DRAWINGS. PANELS SHALL BE STAMPED WITH THE APA TRADEMARK.

WOOD STRUCTURAL PANEL INSTALLATION SHALL BE IN CONFORMANCE WITH APA RECOMMENDATIONS. ALLOW 1/8" SPACING AT PANEL ENDS AND EDGES, UNLESS OTHERWISE RECOMMENDED BY THE PANEL MANUFACTURER.

ALL ROOF SHEATHING AND FLOOR SHEATHING SHALL BE INSTALLED WITH FACE GRAIN OR STRENGTH AXIS PERPENDICULAR TO SUPPORTS, EXCEPT AS INDICATED ON THE DRAWINGS. ROOF SHEATHING SHALL EITHER BE BLOCKED, TONGUE-AND-GROOVE, OR HAVE EDGES SUPPORTED BY PLYCLIPS. WHERE BLOCKING IS SPECIFICALLY INDICATED ON THE DRAWINGS, T&G EDGES OR PLYCLIPS MAY NOT BE SUBSTITUTED. SHEATHING SHALL BE UNBLOCKED, EXCEPT AS INDICATED ON DRAWINGS. FLOOR SHEATHING SHALL BE FIELD GLUED TO THE FRAMING USING ADHESIVES MEETING APA SPECIFICATION AFG-01 OR ASTM D3498. TONGUE AND GROOVE PANELS SHALL ALSO BE GLUED AT THE T&G JOINT.

SHEAR WALL SHEATHING SHALL BE INSTALLED EITHER HORIZONTALLY OR VERTICALLY AND BE BLOCKED WITH 2x FRAMING AT ALL PANEL EDGES. NAILING NOT SHOWN SHALL BE AS INDICATED ON OSSC TABLE 2304.9.1.

WOOD STRUCTURAL PANEL SHEAR WALLS:

SHEAR WALL WOOD STRUCTURAL PANELS SHALL BE PLYWOOD OR OSB PANELS CONFORMING TO THE REQUIREMENTS FOR ITS TYPE SPECIFIED IN U.S. DOC PS1 OR PS2. SHEATHING SHALL BE APPLIED EITHER HORIZONTALLY OR VERTICALLY. SHEET SIZES SHALL BE 4x8 UNLESS AT BOUNDARIES OR FRAMING CHANGES.

NAIL HEADS SHALL BE DRIVEN FLUSH WITH SHEATHING. DO NOT PENETRATE SURFACE PLY WITH NAIL HEADS. IF NAIL HEADS ARE NOT FLUSH NOTIFY SEOR. CONTRACTOR IS RESPONSIBLE FOR ANY REPAIRS NECESSARY DUE TO OVER-PENETRATION OF NAILS.

ALL SHEAR WALL PANEL SHEATHING EDGES SHALL BE BLOCKED. EDGE NAILS SHALL BE AT LEAST 3/8" FROM EDGES AND ENDS OF PANELS. STAGGER NAILING ON EDGES.

GLUED-LAMINATED MEMBERS:

GLUED-LAMINATED (GLULAM) MEMBERS SHALL BE FABRICATED IN CONFORMANCE WITH ANSI STANDARD A190.1, AMERICAN NATIONAL STANDARD FOR STRUCTURAL GLUED LAMINATED TIMBER OR OTHER CODE- APPROVED DESIGN, MANUFACTURING AND/OR QUALITY ASSURANCE PROCEDURES. EACH MEMBER SHALL BEAR AN AITC OR APA-EWS IDENTIFICATION MARK OR BE ACCOMPANIED BY A CERTIFICATE OF CONFORMANCE. ONE COAT OF END SEALER SHALL BE APPLIED IMMEDIATELY AFTER TRIMMING IN EITHER THE SHOP OR THE FIELD.

GLULAM MEMBERS SHALL BE FRAMING (HIDDEN) OR ARCHITECTURAL (EXPOSED) APPEARANCE CLASSIFICATION AND OF THE STRENGTH INDICATED BELOW:

GLUED-LAMINATED MEMBERS				
COMBINATION SYMBOL (SPECIES)	**USE**	**FLEXURAL STRESS, Fb (PSI)**	**MODULUS OF ELASTICITY (PSI)**	**HORIZONTAL SHEAR STRESS Fv (PSI)**
24F-V4 (DF/DF)	SIMPLE SPAN	+2,400 / -1,850	1,800,000	265
24F-1.8E	SIMPLE SPAN	+2,400 / -1,450	1,800,000	265
24F-V8 (DF/DF)	CONTINUOUS OR CANTILEVER	2,400	1,800,000	265

ADHESIVE SHALL BE WET-USE EXTERIOR, WATERPROOF GLUE. FIELD NOTCHING AND BORING OF GLULAM MEMBERS NOT ALLOWED UNLESS APPROVED BY SEOR.

GLULAM MEMBERS SHALL BE SUPPLIED TO THE PROJECT WITH BETWEEN 3,500 AND 5,000 FOOT STANDARD MILL CAMBER WITH TOLERANCES AS ALLOWED BY ANSI A190. THE DRAWINGS WILL INDICATE WHETHER OR NOT ADDITIONAL CAMBER IS REQUIRED.

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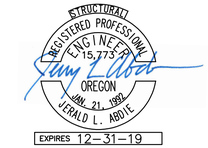

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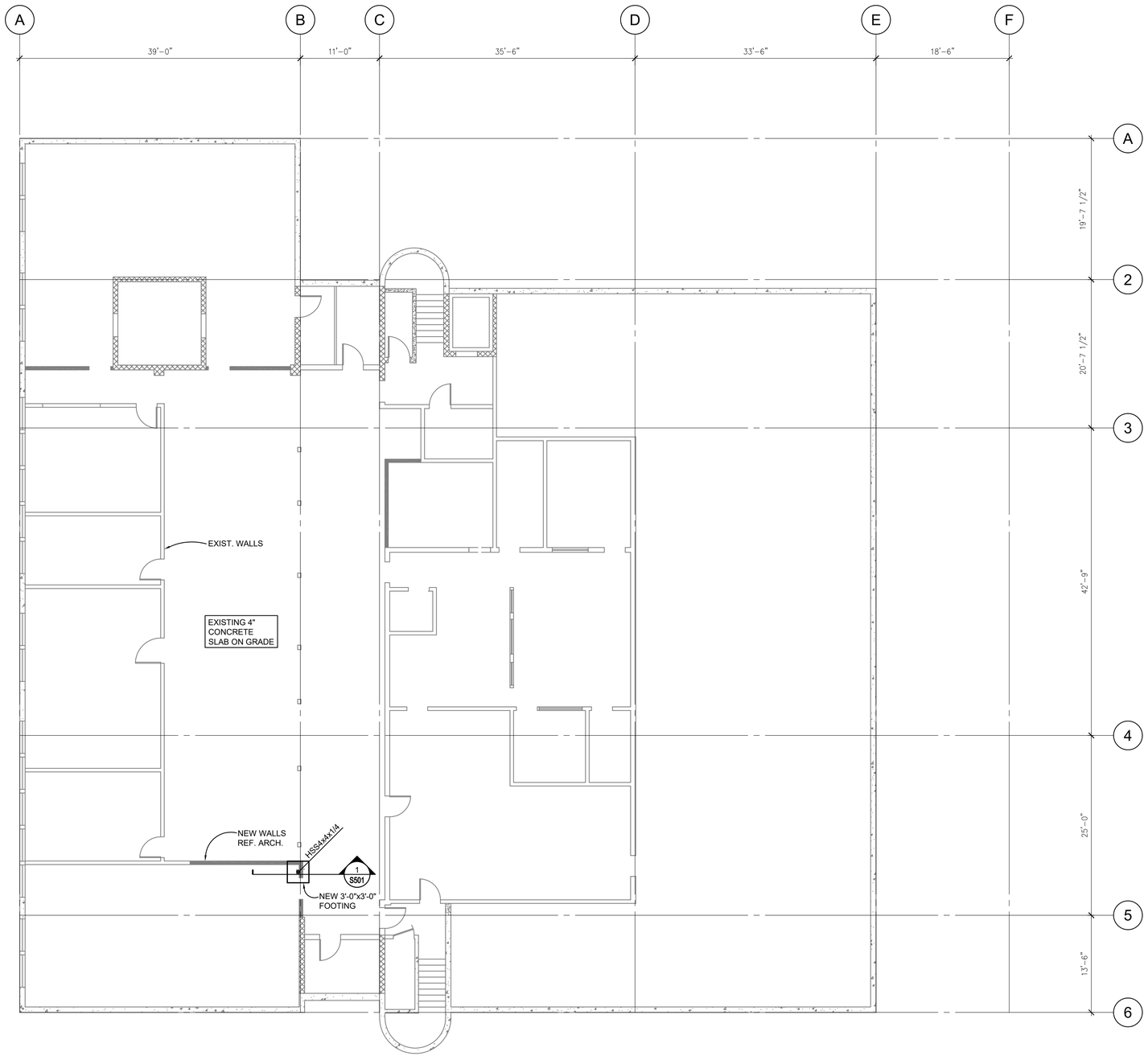

PLAN NOTE:
1. SAWCUT EXISTING SLAB TO INSTALL NEW FOOTING. PLACE TOP OF FOOTING 6" BELOW TOP OF SLAB AND INFILL SLAB ON GRADE AFTER COLUMN PLACEMENT. REF. 1/S501.

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

N

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JERALD L. ABDIE
EXPIRES 12-31-19

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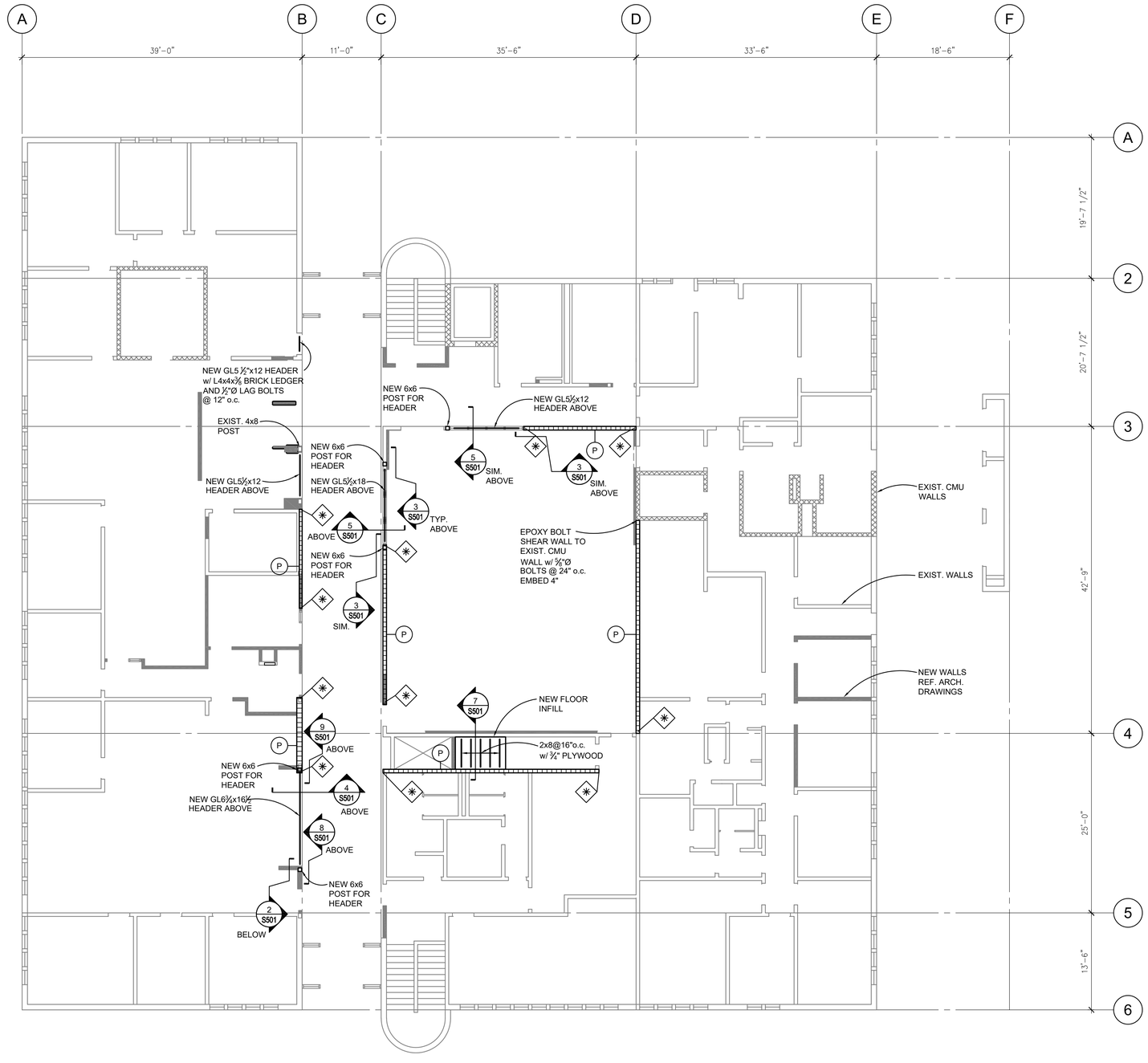

1 FLOOR PLAN - GROUND LEVEL

1/8"=1'-0"

N

PLAN NOTES:

1. INDICATES NEW PLYWOOD SHEAR WALL. FOR NEW PLYWOOD SHEAR WALLS REMOVE GYP. BOARD ON ONE SIDE AND INSTALL ½" PLYWOOD AGAINST EXIST. WOOD STUDS. PLYWOOD TO EXTEND UP TO DOUBLE TOP PLATE AT MECH. WELL ROOF. PROVIDE 2x BLOCKING AT ALL PANEL EDGES. NAIL w/ 8d NAILS @ 4" o.c. AT ALL PANEL EDGES AND 12" o.c. AT INT. FRAMING
2. (P) INDICATES WHICH SIDE OF WALL PLYWOOD IS LOCATED.
3. INDICATES SIMPSON HTT5 HOLDOWN w/ ⅝"Ø THRU-BOLT IN GLU-LAM BEAM BELOW. PROVIDE MINIMUM OF DOUBLE STUDS AT HOLDOWNS, U.N.O.
4. REF. 10/S501 FOR TYPICAL HEADER SCHEDULE, U.N.O.
5. PROVIDE SIMPSON BC60 POST BASE AT ALL NEW 6x6 POSTS, U.N.O.

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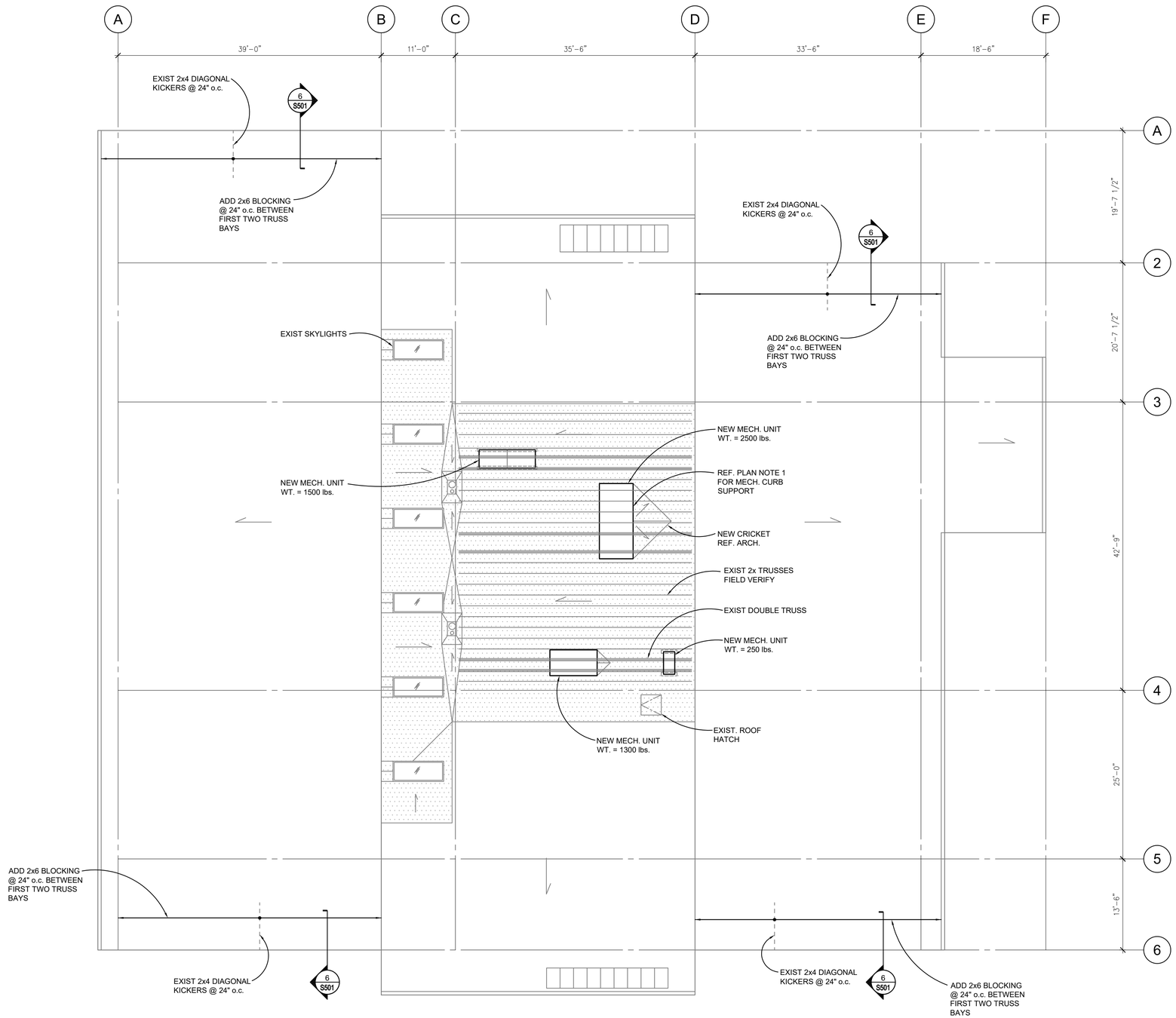

1 ROOF PLAN

1/8"=1'-0"

N

PLAN NOTES:

1. PROVIDE 4x8 BLOCKING AND BEAMS w/ LUS46 HANGERS BETWEEN EXISTING TRUSS TOP CHORD UNDER ALL MECH. CURBS.
2. INFILL EXIST. ROOF PENETRATIONS w/ 2x4 @ 16" o.c. BETWEEN EXISTING TRUSSES AND ADD ½" PLYWOOD. REF. 1/S502 AND ARCH. PLANS.
3. COORDINATE NEW MECH. ROOF PENETRATIONS TO FIT BETWEEN EXISTING TRUSSES. NO TRUSSES ARE TO BE CUT.

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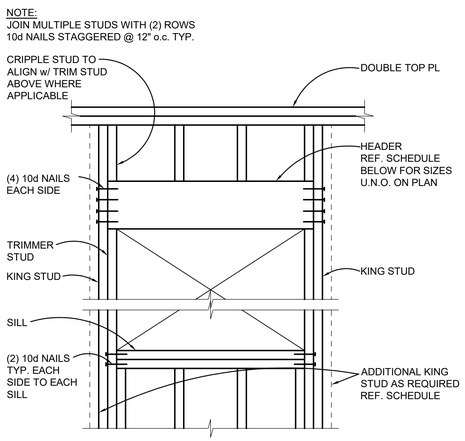
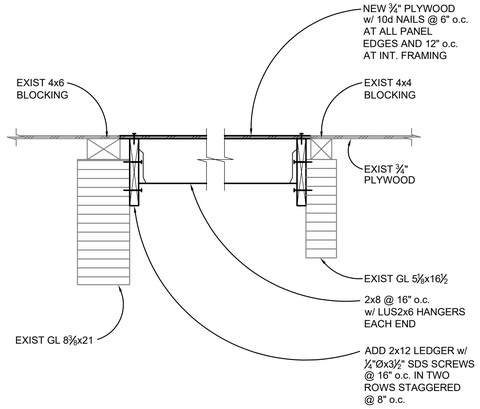
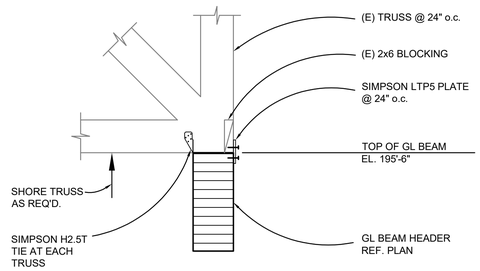


10 WALL OPENING DETAIL
1"=1'-0"

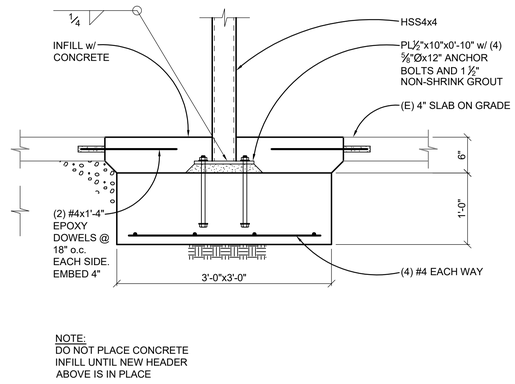
WALL OPENING SCHEDULES				
LOAD BEARING WALLS				
OPENING WIDTH	HEADER	SILL	TRIMMER	KING
0'-0" TO 4'-0"	(2) 2x6	(2) 2x	(1) 2x	(2) 2x
4'-1" TO 6'-0"	4x10	(2) 2x	(1) 2x	(2) 2x
NON-LOAD BEARING WALLS				
OPENING WIDTH	HEADER	SILL	TRIMMER	KING
0'-0" TO 4'-0"	(2) 2x4	(2) 2x	(1) 2x	(1) 2x
4'-1" TO 6'-0"	(2) 2x6	(2) 2x	(1) 2x	(1) 2x



7 SECTION AT FLOOR INFILL
1"=1'-0"



4 HEADER AT (E) TRUSS
1"=1'-0"

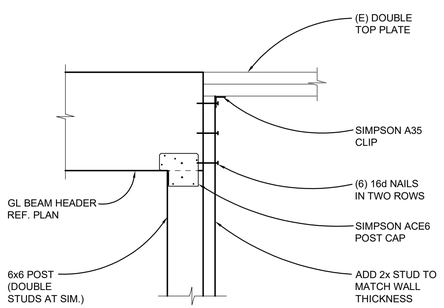


1 FOOTING DETAIL
1"=1'-0"

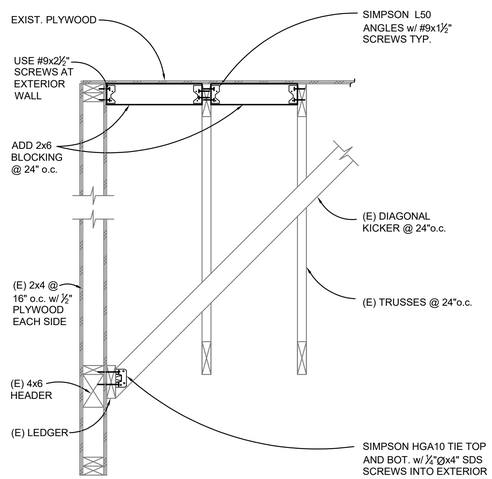
8 HEADER DETAIL AT POST
1"=1'-0"

5 HEADER AT (E) BEARING WALL
1"=1'-0"

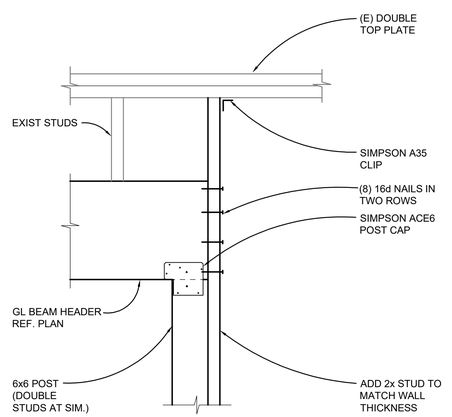
2 COLUMN TO BEAM DETAIL
1"=1'-0"



9 COLUMN TO BEAM DETAIL
1"=1'-0"



6 BRACING AT EXTERIOR WALL
1"=1'-0"



3 COLUMN TO BEAM DETAIL
1"=1'-0"

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EXPIRES 12-31-19

WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

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Client Project No.: 10021800514

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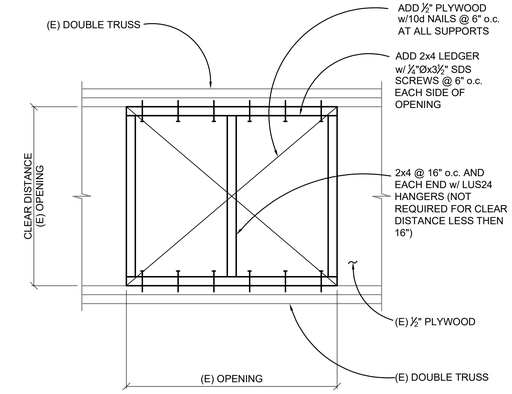

1 ROOF OPENING INFILL DETAIL

1"=1'-0"

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Sheet No. S502

MISC. FITTINGS & SYMBOLS

DIRECTION OF FLOW
DIRECTION OF SLOPE
PIPE SLEEVE
REDUCER
ANCHOR
ELBOW (90°)
ELBOW (45°)
TEE
CROSS
PIPING CONNECTIONS
JOINT OR COUPLING POINT
UNION
FLANGED CONNECTION
CAP
PLUG OR BLIND FLANGE
RISER
ELBOW UP
ELBOW DOWN
TEE UP
TEE DOWN
HORIZONTAL TEE
FLEXIBLE CONNECTION
BALL JOINT
MC MECHANICAL COUPLING

STANDARD PLUMBING ABBREVIATIONS

AF	AIRFOIL	IE	INVERT ELEVATION
AFF	ABOVE FINISHED FLOOR	IN	INCH(ES)
AHP	APPARATUS HOUSING PLENUM	INSUL	INSULATION
ALT	ALTERNATIVE	ISOL	ISOLAT(OR)(ION)
AL	ALUMINUM	KW	KILOWATT
APD	AIR PRESSURE DROP	KWH	KILOWATT HOUR
APPROX	APPROXIMATELY	L	LENGTH
ARCH	ARCHITECT(URAL)	LAT	LEAVING AIR TEMP
AUTO	AUTOMATIC	LB	POUND
BDD	BACKDRAFT DAMPER	LDB	LEAVING DRY BULB
BI	BACKWARD INCLINED	LF	LINEAR FEET
BLDG	BUILDING	LFT	LEAVING FLUID TEMPERATURE
BSMT	BASEMENT	LVG	LEAVING
BTU	BRITISH THERMAL UNIT	LWB	LEAVING WET BULB
BTUH	BRITISH THERMAL UNITS PER HOUR	LWT	LEAVING WATER TEMPERATURE
CFH	CUBIC FEET PER HOUR	MAX	MAXIMUM
CFM	CUBIC FEET PER MINUTE	MBH	THOUSAND BTU PER HOUR
CFS	CUBIC FEET PER SECOND	MECH	MECHANICAL
CLG	CEILING OR COOLING	MFR	MANUFACTURER
CONC	CONCRETE	MIN	MINIMUM
CONN	CONNECT(ION)	MISC	MISCELLANEOUS
CONT	CONTINUE(ED)(UATION)	MTD	MOUNTED
CL	CENTERLINE	NC	NORMALLY CLOSED
DDC	DIRECT DIGITAL CONTROL	NIC	NOT IN CONTRACT
DEFL	DEFLECTION	NO	NORMALLY OPEN
DN	DOWN	OAD	OUTSIDE AIR DAMPER
DP	DEW POINT	OC	ON CENTER DISTANCE
DWDI	DOUBLE WIDTH DOUBLE INLET	OSA	OUTSIDE AIR
DWG	DRAWING	PH	PHASE
EA	EXHAUST AIR	PP	POLYPROPYLENE
EAD	EXHAUST AIR DAMPER	PSI	POUNDS PER SQUARE INCH
EAT	ENTERING AIR TEMPERATURE	PVC	POLYVINYL CHLORIDE
EDB	ENTERING DRY BULB	PVS	PVC COATED STEEL
EFF	EFFICIENCY	R (RAD)	RADIUS
EFT	ENTERING FLUID TEMPERATURE	RA	RETURN AIR
ELEC	ELECTRIC(AL)	RAD	RETURN AIR DAMPER
ELEV	ELEVATION	REV	REVISION
ENGR	ENGINEER	RH	RELATIVE HUMIDITY
EQ	EQUAL	RPM	REVOLUTIONS PER MINUTE
EQUIP	EQUIPMENT	SA	SUPPLY AIR
ESP	EXTERNAL STATIC PRESSURE	SCFM	STANDARD CUBIC FEET PER MINUTE
EWB	ENTERING WET BULB	SD	SMOKE DAMPER
EWT	ENTERING WATER TEMPERATURE	SECT	SECTION
EX	EXTRACTOR	SENS	SENSIBLE
EXH	EXHAUST	SIM	SIMILAR
EXIST	EXISTING	SP	STATIC PRESSURE
EXP	EXPANSION	SPEC	SPECIFICATION
F	DEGREES FAHRENHEIT	SQ	SQUARE
FC	FORWARD CURVED	SF	SQUARE FOOT(FEET)
FIG	FIGURE	SQ IN	SQUARE INCH(ES)
FILT	FILTER	SS	STAINLESS STEEL
FLEX	FLEXIBLE	STL	STEEL
FPD	FLUID PRESSURE DROP	STRUCT	STRUCTUR(E)(AL)
FPM	FEET PER MINUTE	SWP	SINGLE WALL PLENUM
FPS	FEET PER SECOND	SWSI	SINGLE WIDTH SINGLE INLET
FT	FEET/FOOT	TEMP	TEMPERATURE
FTR	FINNED TUBE RADIATOR	TSP	TOTAL STATIC PRESSURE
FU	FIXTURE UNIT	TYP	TYPICAL
FUT	FUTURE	V	VOLTS
FV	FACE VELOCITY	VD	VOLUME DAMPER
GA	GAGE/GAUGE	VEL	VELOCITY
GAL	GALLON	VERT	VERTICAL
GALV	GALVANIZED	VFD	VARIABLE FREQUENCY DRIVE
GLY	GLYCOL	VTR	VENT THROUGH ROOF
GPH	GALLONS PER HOUR	W	WIDTH
GPM	GALLONS PER MINUTE	WG	WATER GAUGE
H	HEIGHT	WPD	WATER PRESSURE DROP
HORIZ	HORIZONTAL	WTD	WATER TEMPERATURE DROP
HP	HORSEPOWER	WTR	WATER TEMPERATURE RISE
HTG	HEATING	W/	WITH
ID	INSIDE(DIAMETER/DIMENSION)	W/O	WITHOUT

DEMOLITION LEGEND

REMOVE EXISTING PIPE

NEW AND EXISTING WORK

EXISTING WASTE (BELOW GRADE OR FLOOR)
EXISTING COLD WATER
NEW WASTE (BELOW GRADE OR FLOOR)
NEW COLD WATER

MISC. VALVES & COCKS

SHUT-OFF VALVE
GLOBE VALVE
SHUT-OFF VALVE W/ TAMPER SWITCH
TRIPLE DUTY VALVE
CHECK VALVE
2-WAY CONTROL VALVE
3-WAY CONTROL VALVE
BALANCING VALVE
FLOW CONTROL VALVE
SOLENOID VALVE
PRESSURE REDUCING VALVE
AIR VENT (MANUAL/AUTOMATIC)
RELIEF VALVE
STRAINER
STRAINER W/ BLOWDOWN
DRAIN VALVE
HOSE BIBB
WALL HYDRANT
GROUND HYDRANT
STEAM TRAP
PRESSURE GAUGE
PRESSURE/TEMPERATURE TEST PLUG
THERMOMETER
FLOW SWITCH
TEMPERATURE TRANSMITTER
SHOCK ARRESTOR
VACUUM BREAKER
WATER FLOW METER
REDUCED PRESSURE BACKFLOW ASSEMBLY
DOUBLE CHECK VALVE ASSEMBLY
DOUBLE CHECK DETECTOR ASSEMBLY
BACKWATER VALVE
UNDERGROUND GATE VALVE W/BOX
UNDERGROUND GATE W/POST INDICATOR
OUTSIDE SCREW & YOKE
Y PATTERN BOILER BLOWDOWN VALVE
NON-RETURN STOP VALVE
QUICK OPENING BOILER BLOWDOWN VALVE

PLUMBING SYMBOLS

THRUST BLOCK
CLEANOUT
WALL CLEANOUT
FLOOR CLEANOUT
CLEANOUT TO GRADE
FLOOR DRAIN
AREA DRAIN
CATCH BASIN
FLOOR SINK
ROOF DRAIN
OVERFLOW DRAIN
DOWNSPOUT NOZZLE
TRENCH DRAIN
MANHOLE (INVERTS IN & OUT)

SYMBOLS

A	ACCESS PANEL	K	CAP EXISTING / CAP FOR FUTURE
B	BELOW GRADE / FLOOR	R	RELOCATE EXISTING
C	CONNECT TO EXISTING	X	REMOVE EXISTING
E	EXISTING TO REMAIN	1	NOTE

GENERAL NOTE

THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

PLUMBING PIPING

W	W	WASTE (ABOVE GRADE OR FLOOR)
W	W	WASTE (BELOW GRADE OR FLOOR)
PW	PW	PUMPED WASTE (ABOVE GRADE OR FLOOR)
PW	PW	PUMPED WASTE (BELOW GRADE OR FLOOR)
SD	SD	STORM DRAIN (ABOVE GRADE OR FLOOR)
SD	SD	STORM DRAIN (BELOW GRADE OR FLOOR)
PSD	PSD	PUMPED STORM DRAIN (ABOVE GRADE OR FLOOR)
PSD	PSD	PUMPED STORM DRAIN (BELOW GRADE OR FLOOR)
OD	OD	OVERFLOW DRAIN (ABOVE GRADE OR FLOOR)
OD	OD	OVERFLOW DRAIN (BELOW GRADE OR FLOOR)
D	D	DRAIN (CONDENSATE/INDIRECT)
V	V	VENT
CW	CW	COLD WATER
HW	HW	HOT WATER
RHW	RHW	RECIRCULATING HOT WATER
TW	TW	TEMPERED WATER
HTW	HTW	140° HOT WATER
RHTW	RHTW	140° RECIRCULATING HOT WATER
RTW	RTW	RECIRCULATING TEMPERED WATER
LP	LP	LOW PRESSURE COLD WATER
LP	LP	LOW PRESSURE HOT WATER
LP	LP	LOW PRESSURE RECIRCULATING HOT WATER
HP	HP	HIGH PRESSURE COLD WATER
HP	HP	HIGH PRESSURE HOT WATER
HP	HP	HIGH PRESSURE RECIRCULATING HOT WATER
DWS	DWS	DRINKING WATER SUPPLY (CHILLED)
DWR	DWR	DRINKING WATER RETURN (CHILLED)
IW	IW	ICE WATER
WW	WW	WELL WATER
ICW	ICW	INDUSTRIAL COLD WATER
G	G	NATURAL GAS (LOW PRESSURE)
MPG	MPG	NATURAL GAS (MEDIUM PRESSURE)
GV	GV	GAS VENT
PT	PT	PNEUMATIC TUBE
SHWS	SHWS	SOLAR HOT WATER SUPPLY
SHWR	SHWR	SOLAR HOT WATER RETURN

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12/14/2018
EXPIRES 12-31-2018

WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

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SYMBOLS, LEGENDS & ABBREVIATIONS - PLUMBING

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. P001

PLUMBING FIXTURE SCHEDULE

TAG NUMBER	FIXTURE TYPE	ROUGH-IN SIZE (INCHES) W	V	CW	HW	TW	GPM/GPF	ELEC. CONNECTION	DESCRIPTION	NOTES
WC-1	WATER CLOSET	4	2	1-1/2	-	-	1.1	Y	WALL HUNG, SENSOR FLUSH VALVE	
WC-2	WATER CLOSET	4	2	1-1/2	-	-	1.1	Y	WALL HUNG, SENSOR FLUSH VALVE, ADA	
U-1	URINAL	2	1-1/2	1-1/4	-	-	0.5	Y	WALL HUNG, SENSOR FLUSH VALVE, ADA	
L-1	LAVATORY	2	1-1/2	1/2	1/2	-	0.5	Y	WALL HUNG, 18" X 20", SENSOR FAUCET, ADA	
SH-1	SHOWER	2	1-1/2	3/4	3/4	-	1.5	N	GELCOAT ENCLOSURE, 36x36-INCH ENCLOSURE, ADA (ADAPTABLE)	
EWC-1	ELECTRIC WATER COOLER	2	1-1/4	1/2	-	-	-	Y	WALL HUNG, DUAL HEIGHT, ADA, BOTTLE FILLER	

GENERAL NOTES:

A. NONE.

B. NONE.

NOTES:

1. NONE.

2. NONE.

DRAINS AND CLEANOUTS SCHEDULE

TAG	DESCRIPTION	MANUFACTURER	MODEL NO.	STRAINER	REMARKS
FD-1	FLOOR DRAIN	JR SMITH	2005B-Y-U-NB-P050	5" SQ	NO HUB, VANDAL RESISTANT, NICKEL BRONZE, PRIMER CONNECTION
RD-1	ROOF DRAIN	JR SMITH	1330-Y	8"	NO HUB, LOW PROFILE, IRON BODY
OD-1	OVERFLOW ROOF DRAIN	JR SMITH	1330-Y	8"	NO HUB, LOW PROFILE, IRON BODY, HIGH WATER DAM

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SCHEDULES - PLUMBING

Scale N.T.S.

Date DECEMBER 14, 2018

Sheet No. P002

1 P101 DEMO FLOOR PLAN - GROUND LEVEL - PLUMBING

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

GENERAL NOTES:

A. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF PLUMBING FIXTURES TO BE MODIFIED/DEMOLISHED.
B. EXISTING PIPING SHOWN FOR REFERENCE. ACTUAL PIPING MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY EXISTING CONDITIONS AND ALERT THE ARCHITECT TO ANY DISCREPANCIES PRIOR TO COMMENCING WORK.

⬡ NOTES:

1. REMOVE EXISTING PLUMBING FIXTURES IN THIS AREA. CUT BACK PIPING AS REQUIRED TO PROVIDE ADEQUATE CONNECTION CLEARANCE FOR NEW FIXTURE.
2. DEMOLISH EXISTING FLOOR DRAINS.
3. DEMOLISH EXISTING MOP SINK AND CAP DRAIN.
4. DEMOLISH EXISTING DRINKING FOUNTAIN.

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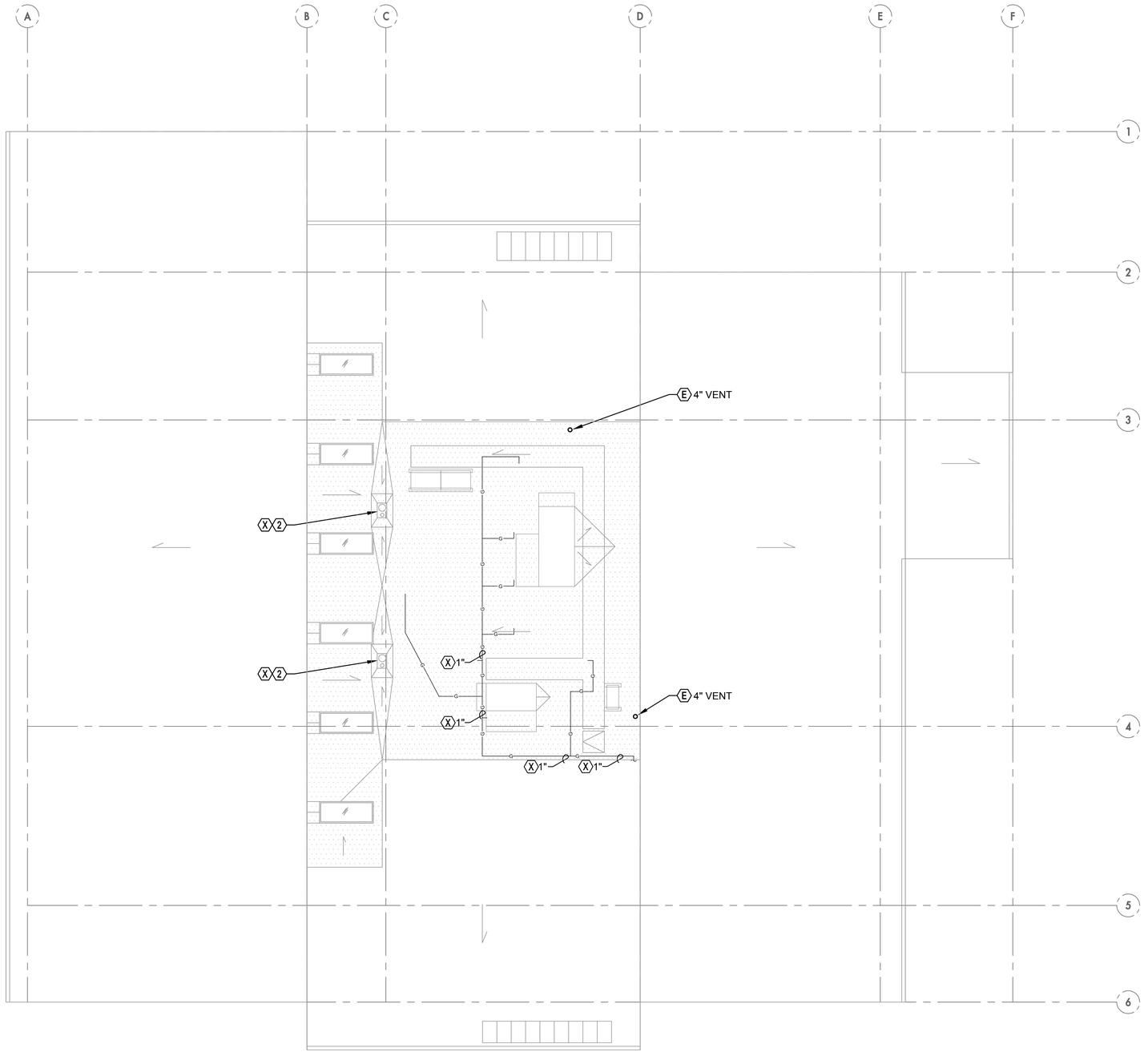
GROUND FLOOR DEMO PLAN - PLUMBING

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. P101



1 P102 DEMOLITION PLAN - ROOF - PLUMBING
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

A. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF PLUMBING FIXTURES TO BE MODIFIED/DEMOLISHED.
B. EXISTING PIPING SHOWN FOR REFERENCE. ACTUAL PIPING MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY EXISTING CONDITIONS AND ALERT THE ARCHITECT TO ANY DISCREPANCIES PRIOR TO COMMENCING WORK.
C. EXISTING PLUMBING VENTS IN NEW ROOF AREA TO REMAIN.

NOTES:

1. EXISTING CARRIER 38QN030340 CONDENSER TO BE DEMOLISHED
2. EXISTING ROOF RAIN AND OVERFLOW DRAIN HOUSINGS TO BE DEMOLISHED.

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ROOF DEMOPLAN - PLUMBING

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. P102

1 / P201 FLOOR PLAN - GROUND LEVEL - PLUMBING

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

GENERAL NOTES:

A. EXISTING PIPING SHOWN FOR REFERENCE. ACTUAL PIPING MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY EXISTING CONDITIONS AND ALERT THE ARCHITECT TO ANY DISCREPANCIES PRIOR TO COMMENCING WORK.

NOTES:

1. PROVIDE NEW SHOWER. COORDINATE DRAIN AND SUPPLY CONNECTIONS WITH NEW FIXTURE. MODIFY EXISTING PIPING AS REQUIRED TO MAKE FULL CONNECTION.

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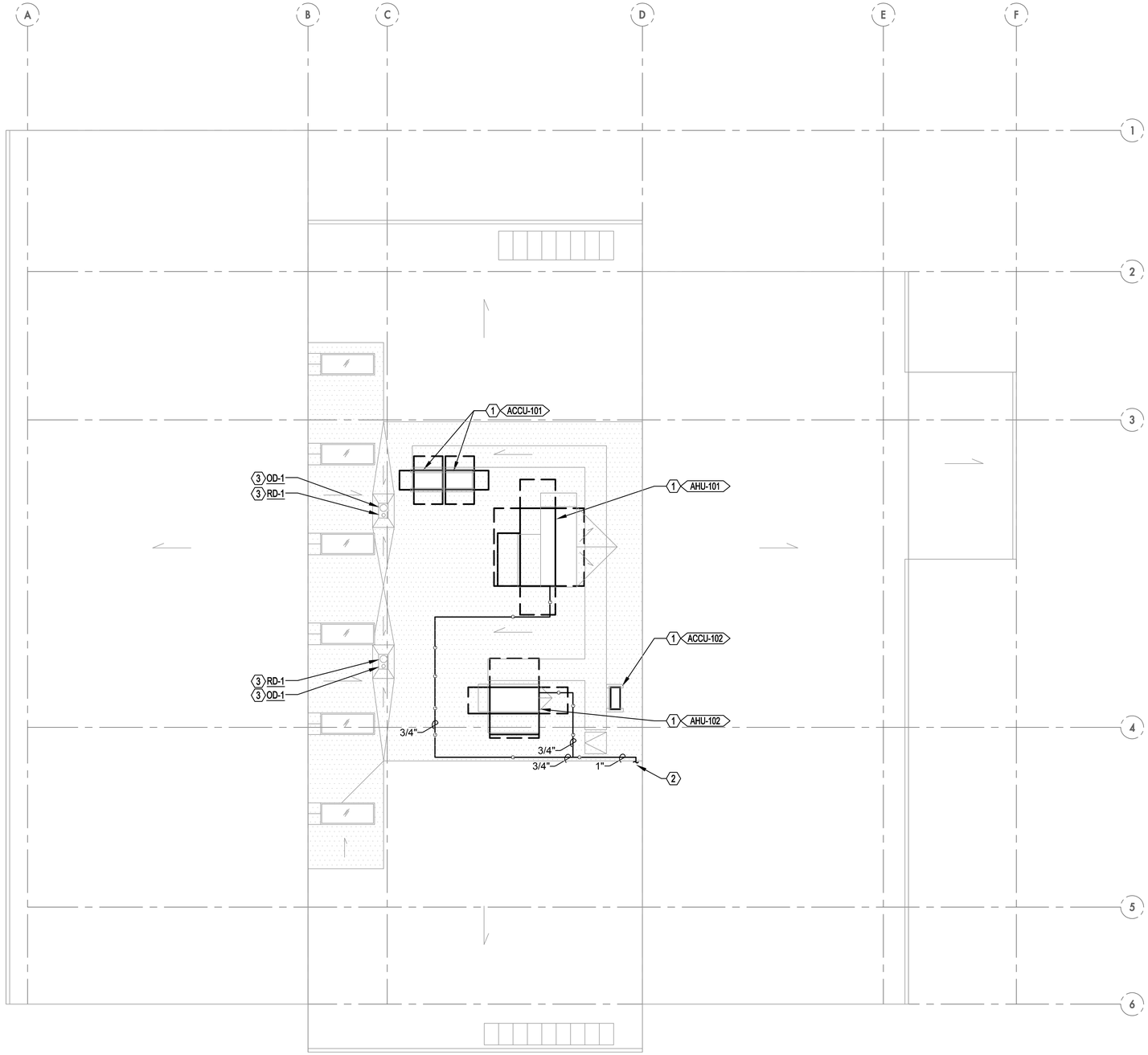
GROUND FLOOR PLAN - PLUMBING

Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
Sheet No.	P201



1 P202 FLOOR PLAN - ROOF - PLUMBING

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

N

GENERAL NOTES:

A. EXISTING PIPING SHOWN FOR REFERENCE. ACTUAL PIPING MAY VARY FROM WHAT IS SHOWN. FIELD VERIFY EXISTING CONDITIONS AND ALERT THE ARCHITECT TO ANY DISCREPANCIES PRIOR TO COMMENCING WORK.

NOTES:

1. ROUTE AHU COOLING COIL CONDENSATE TO DISCHARGE ON ROOF DECK OR APPROVED RECEPTACLE.
2. CONNECT TO EXISTING 2" GAS SERVICE
3. CONNECT NEW ROOF RAIN AND OVERFLOW DRAIN TO EXISTING DRAINAGE PIPING. COORDINATE CONNECTION SIZE/TYPE WITH EXISTING PIPING. COORDINATE ELEVATION OF DRAIN WITH NEW ROOFING SYSTEM AND ADJUST PIPING CONNECTIONS AS REQUIRED.

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ROOF PLAN - PLUMBING

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. P202

STANDARD MECHANICAL ABBREVIATIONS

AF	AIRFOIL	IE	INVERT ELEVATION
AFF	ABOVE FINISHED FLOOR	IN	INCH(ES)
AHP	APPARATUS HOUSING PLENUM	INSUL	INSULATION
ALT	ALTERNATIVE	ISOL	ISOLAT(OR)(ION)
AL	ALUMINUM	KW	KILOWATT
APD	AIR PRESSURE DROP	KWH	KILOWATT HOUR
APPROX	APPROXIMATELY	L	LENGTH
ARCH	ARCHITECT(URAL)	LAT	LEAVING AIR TEMP
AUTO	AUTOMATIC	LB	POUND
BDD	BACKDRAFT DAMPER	LDB	LEAVING DRY BULB
BI	BACKWARD INCLINED	LF	LINEAR FEET
BLDG	BUILDING	LFT	LEAVING FLUID TEMPERATURE
BSMT	BASEMENT	LVG	LEAVING
BTU	BRITISH THERMAL UNIT	LWB	LEAVING WET BULB
BTUH	BRITISH THERMAL UNITS PER HOUR	LWT	LEAVING WATER TEMPERATURE
CFH	CUBIC FEET PER HOUR	MAX	MAXIMUM
CFM	CUBIC FEET PER MINUTE	MBH	THOUSAND BTU PER HOUR
CFS	CUBIC FEET PER SECOND	MECH	MECHANICAL
CLG	CEILING OR COOLING	MFR	MANUFACTURER
CONC	CONCRETE	MIN	MINIMUM
CONN	CONNECT(ION)	MISC	MISCELLANEOUS
CONT	CONTINUE(ED)(UATION)	MTD	MOUNTED
CL	CENTERLINE	NC	NORMALLY CLOSED
DDC	DIRECT DIGITAL CONTROL	NIC	NOT IN CONTRACT
DEFL	DEFLECTION	NO	NORMALLY OPEN
DN	DOWN	OAD	OUTSIDE AIR DAMPER
DP	DEW POINT	OC	ON CENTER DISTANCE
DWDI	DOUBLE WIDTH DOUBLE INLET	OSA	OUTSIDE AIR
DWG	DRAWING	PH	PHASE
EA	EXHAUST AIR	PP	POLYPROPYLENE
EAD	EXHAUST AIR DAMPER	PSI	POUNDS PER SQUARE INCH
EAT	ENTERING AIR TEMPERATURE	PVC	POLYVINYL CHLORIDE
EDB	ENTERING DRY BULB	PVS	PVC COATED STEEL
EFF	EFFICIENCY	R (RAD)	RADIUS
EFT	ENTERING FLUID TEMPERATURE	RA	RETURN AIR
ELEC	ELECTRIC(AL)	RAD	RETURN AIR DAMPER
ELEV	ELEVATION	REV	REVISION
ENGR	ENGINEER	RH	RELATIVE HUMIDITY
EQ	EQUAL	RPM	REVOLUTIONS PER MINUTE
EQUIP	EQUIPMENT	SA	SUPPLY AIR
ESP	EXTERNAL STATIC PRESSURE	SCFM	STANDARD CUBIC FEET PER MINUTE
EWB	ENTERING WET BULB	SD	SMOKE DAMPER
EWT	ENTERING WATER TEMPERATURE	SECT	SECTION
EX	EXTRACTOR	SENS	SENSIBLE
EXH	EXHAUST	SIM	SIMILAR
EXIST	EXISTING	SP	STATIC PRESSURE
EXP	EXPANSION	SPEC	SPECIFICATION
F	DEGREES FAHRENHEIT	SQ	SQUARE
FC	FORWARD CURVED	SF	SQUARE FOOT(FEET)
FIG	FIGURE	SQ IN	SQUARE INCH(ES)
FILT	FILTER	SS	STAINLESS STEEL
FLEX	FLEXIBLE	STL	STEEL
FPD	FLUID PRESSURE DROP	STRUCT	STRUCTURE(AL)
FPM	FEET PER MINUTE	SWP	SINGLE WALL PLENUM
FPS	FEET PER SECOND	SWSI	SINGLE WIDTH SINGLE INLET
FT	FEET/FOOT	TEMP	TEMPERATURE
FTR	FINNED TUBE RADIATOR	TSP	TOTAL STATIC PRESSURE
FU	FIXTURE UNIT	TYP	TYPICAL
FUT	FUTURE	V	VOLTS
FV	FACE VELOCITY	VD	VOLUME DAMPER
GA	GAGE/GAUGE	VEL	VELOCITY
GAL	GALLON	VERT	VERTICAL
GALV	GALVANIZED	VFD	VARIABLE FREQUENCY DRIVE
GLY	GLYCOL	VTR	VENT THROUGH ROOF
GPH	GALLONS PER HOUR	W	WIDTH
GPM	GALLONS PER MINUTE	WG	WATER GAUGE
H	HEIGHT	WPD	WATER PRESSURE DROP
HORIZ	HORIZONTAL	WTD	WATER TEMPERATURE DROP
HP	HORSEPOWER	WTR	WATER TEMPERATURE RISE
HTG	HEATING	W/	WITH
ID	INSIDE(DIAMETER/DIMENSION)	W/O	WITHOUT

DEMOLITION LEGEND

REMOVE EXISTING DUCT

REMOVE EXISTING PIPE

NEW AND EXISTING WORK

EXISTING WASTE (BELOW GRADE OR FLOOR)

EXISTING COLD WATER

EXISTING DUCT WORK

NEW WASTE (BELOW GRADE OR FLOOR)

NEW COLD WATER

NEW DUCT WORK

HVAC PIPING

CHWS	CHWS	CHILLED WATER SUPPLY
CHWR	CHWR	CHILLED WATER RETURN
HWS	HWS	HEATING WATER SUPPLY
HWR	HWR	HEATING WATER RETURN
HTWS	HTWS	HIGH TEMP. HOT WATER SUPPLY
HTWR	HTWR	HIGH TEMP. HOT WATER RETURN
HRWS	HRWS	HEAT RECOVERY WATER SUPPLY
HRWR	HRWR	HEAT RECOVERY WATER RETURN
RS	RS	REFRIGERANT SUCTION
RL	RL	REFRIGERANT LIQUID
RHG	RHG	REFRIGERANT HOT GAS
RRV	RRV	REFRIGERANT RELIEF VENT

CONTROL SYMBOLS

DAMPER WITH OPERATOR
2-WAY CONTROL VALVE
3-WAY CONTROL VALVE
DIGITAL OUTPUT FROM DDC PANEL
DIGITAL INPUT TO DDC PANEL
ANALOG OUTPUT FROM DDC PANEL
ANALOG INPUT TO DDC PANEL
DIFFERENTIAL PRESSURE SWITCH
EP VALVE
STATIC PRESSURE CONTROLLER
VELOCITY PRESSURE TRANSMITTER
PNEUMATIC RELAY
DAMPER END SWITCH
CARBON MONOXIDE SENSOR
CARBON DIOXIDE SENSOR
AIR MONITORING STATION
VELOCITY PRESSURE PROBE
PE SWITCH
DUCT SMOKE DETECTOR
WATER FLOW METER WITH ELECTRONIC TRANSMITTER
PUSH BUTTON SWITCH
SWITCHED MAIN AIR
PRESSURE TRANSMITTER
MAIN AIR
ELECTRONIC HUMIDITY TRANSMITTER
DUCT MOUNTED HIGH LIMIT HUMIDISTAT
ELECTRONIC TEMPERATURE SENSOR
FLOW SWITCH
ELECTRONIC SENSOR WITH AVERAGING
CURRENT TRANSFORMER / STATUS INDICATOR

DUCT LEGEND

CFM TYPE — FLOW DIRECTION (NONE SHOWN IF 4-WAY)

CFM SIZE TYPE

RETURN EXHAUST SUPPLY

SEE SPECS FOR TYPE
SEE SCHEDULE FOR SIZE

NECK SIZE (SIDEWALL & FLOOR GRILLE)
PLENUM INLET SIZE (SLOT DIFFUSER)

TYPE REFERENCE
H = 6" BELOW CEILING
L = 6" ABOVE FLOOR
F = FLOOR
S = SLOT DIFFUSER
C = CEILING
T = DOOR TRANSFER

CEILING DIFFUSERS & GRILLES — SIDEWALL, SLOTS & FLOOR GRILLES

BOX NUMBER — TU-X-XXX 500 — MAXIMUM CFM

BOX TYPE KEY
TU - X - XXX
TERMINAL UNIT NUMBER
FLOOR UNIT IS LOCATED ON
AIR HANDLER NUMBER
TERMINAL UNIT

TERMINAL UNITS

EF-XXX
UNIT NUMBER
FLOOR UNIT IS LOCATED ON
EQUIPMENT TYPE

EQUIPMENT

SUPPLY AIR | RETURN AIR | EXHAUST AIR | OUTSIDE AIR — DUCT SECTIONS

FSD FD SD
COMBINATION FIRE/SMOKE | FIRE | SMOKE | VOLUME | AUTOMATIC

DAMPERS

RETURN OR EXHAUST AIR FLOW

SUPPLY OR OUTSIDE AIR FLOW

UC 1/2" — UNDERCUT DOOR

LOW PRESSURE DUCTWORK

R=2D FOR FLEX — R=1-1/2D FOR ROUND

SECTION | PLAN — FLEX DUCT — ROUND DUCT

RETURN OR EXH. GRILLE CONNECTION

SUPPLY DIFFUSER CONNECTION

LINED PLENUM — FLEX DUCT — SPIN-IN FITTING

SECTION | PLAN — RECTANGULAR DUCT — SQUARE NECK

RETURN OR EXHAUST GRILLE — SUPPLY DIFFUSER SIDE FLEX CONNECTION

SUPPLY DIFFUSER HARD CONNECTION — SIDE WALL SUPPLY GRILLE CONNECTION

MEDIUM PRESSURE DUCTWORK

CONICAL TEE | LOW LOSS | LATERAL TEE | CONICAL LATERAL — BRANCH FITTINGS

R=1-1/2D — ELBOW — Y-BRANCH

R=2D — BELLMOUTH

L=D1-D2 — REDUCERS

DUCT DETAILS (LOW VELOCITY)

W — R=1-1/2W — RADIUS ELBOW

TURNING VANES IN ALL ELBOWS AND TEES — MITER ELBOWS & TEES

FLEX CONNECTION

12x6 — 12x6 — SIZE SHOWN IS CLEAR AIR PASSAGE — ACOUSTICAL LINER

LESS THAN 15° | 15° TO 30° | GREATER THAN 30° — DUCT OFFSETS

30° MAX — 30° MAX — RECTANGULAR TO ROUND — TRANSITIONS

45° — 4" MIN OR 1/4W OR 12" MAX — RECTANGULAR DUCT FITTINGS

SPIN-IN FITTING — CONICAL SPIN-IN FITTING — RECTANGULAR TO ROUND FITTINGS

GENERAL NOTE

THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

MISC. VALVES & COCKS

SHUT-OFF VALVE
GLOBE VALVE
SHUT-OFF VALVE W/ TAMPER SWITCH
TRIPLE DUTY VALVE
CHECK VALVE
2-WAY CONTROL VALVE
3-WAY CONTROL VALVE
BALANCING VALVE
FLOW CONTROL VALVE
SOLENOID VALVE
PRESSURE REDUCING VALVE
AIR VENT (MANUAL/AUTOMATIC)
RELIEF VALVE
STRAINER
STRAINER W/ BLOWDOWN
DRAIN VALVE
HOSE BIBB
WALL HYDRANT
GROUND HYDRANT
STEAM TRAP
PRESSURE GAUGE
PRESSURE/TEMPERATURE TEST PLUG
THERMOMETER
FLOW SWITCH
TEMPERATURE TRANSMITTER
SHOCK ARRESTOR
VACUUM BREAKER
WATER FLOW METER
REDUCED PRESSURE BACKFLOW ASSEMBLY
DOUBLE CHECK VALVE ASSEMBLY
DOUBLE CHECK DETECTOR ASSEMBLY
BACKWATER VALVE
UNDERGROUND GATE VALVE W/BOX
UNDERGROUND GATE W/POST INDICATOR
OUTSIDE SCREW & YOKE
Y PATTERN BOILER BLOWDOWN VALVE
NON-RETURN STOP VALVE
QUICK OPENING BOILER BLOWDOWN VALVE

MISC. FITTINGS & SYMBOLS

DIRECTION OF FLOW
DIRECTION OF SLOPE
PIPE SLEEVE
REDUCER
ANCHOR
ELBOW (90°)
ELBOW (45°)
TEE
CROSS
PIPING CONNECTIONS
JOINT OR COUPLING POINT
UNION
FLANGED CONNECTION
CAP
PLUG OR BLIND FLANGE
RISER
ELBOW UP
ELBOW DOWN
TEE UP
TEE DOWN
HORIZONTAL TEE
FLEXIBLE CONNECTION
BALL JOINT
MECHANICAL COUPLING

SYMBOLS

(A) ACCESS PANEL	(K) CAP EXISTING / CAP FOR FUTURE
(B) BELOW GRADE / FLOOR	(R) RELOCATE EXISTING
(C) CONNECT TO EXISTING	(X) REMOVE EXISTING
(E) EXISTING TO REMAIN	(1) NOTE

CALL OUT SYMBOLS

WALL MOUNTED
PENDANT MOUNTED

(T) TEMPERATURE	(CO) CARBON MONOXIDE
(H) HUMIDITY	(CO2 1000) CARBON DIOXIDE
(P) PRESSURE	(NOX) NITROGEN OXIDE

ROOM SENSORS

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EXPIRES 12-31-2018

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SYMBOLS, LEGENDS & ABBREVIATIONS - MECHANICAL

Scale N.T.S.

Date DECEMBER 14, 2018

Sheet No. M001

DESIGN CONDITIONS - PORTLAND, OR

SPACE	WINTER		SUMMER	
	TEMPERATURE	HUMIDITY	TEMPERATURE	HUMIDITY
OUTDOOR	25.2° F DB	9.6° F DP / 9.0 HR / 29.8 ° F MCDB	91.4° F DB / 67.3° F MCWB	63.2° F DP / 87.0 HR / 75.1° F MCDB
INDOOR	70° F ± 2° F DB	50% RH MAX, NO MINIMUM	75° F ± 2° F DB	50% RH MAX, NO MINIMUM

GENERAL NOTES:
A. OUTDOOR CONDITIONS BASED ON ASHRAE FUNDAMENTALS 2013 99.6% AND 0.4% DATA.

TERMINAL UNIT SCHEDULE

TAG NUMBER	LOCATION	TYPE	PRIMARY AIR INLET (IN)	PRIMARY AIR MAX CFM	PRIMARY AIR MIN CFM	MANUFACTURER & MODEL	NOTES
VAV-001	OPEN STORAGE 010	VV	7	400	146	PRICE SDV	
VAV-002	CONF ROOM 004	VV	7	400	109	PRICE SDV	1,2
VAV-003	TRAINING AREA 006	VV	7	400	214	PRICE SDV	1,2
VAV-004	OPEN STORAGE 010	VV	7	400	319	PRICE SDV	
VAV-005	IT STORAGE 023	VV	7	400	100	PRICE SDV	
VAV-101	LEGAL ASSISTANT 106	VV	7	400	125	PRICE SDV	
VAV-102	FINANCE DEPT 107	VV	7	400	191	PRICE SDV	
VAV-103	HALLWAY 162	VV	7	400	148	PRICE SDV	
VAV-104	LUNCH ROOM 140	VV	7	400	155	PRICE SDV	
VAV-105	HR DIRECTOR 156	VV	7	400	338	PRICE SDV	1,2
VAV-106	HR DIRECTOR 156	VV	7	400	248	PRICE SDV	

GENERAL NOTES:
A. AIR PRESSURE DROP THROUGH TERMINAL UNIT TO BE NO GREATER THAN 0.25 IN.WG.

NOTES:
1. CO2 SENSOR LOCATED ADJACENT TO THERMOSTAT.
2. OCCUPANCY SENSOR IN SPACE TURNS TERMINAL UNIT OFF WHEN SPACE IS UNOCCUPIED.

KEY:
VV = VARIABLE AIR VOLUME TERMINAL UNIT

VRF HEAT RECOVERY PORTS

TAG NUMBER	LOCATION	ELECTRICAL FLA	ELECTRICAL VOLT/ PHASE	APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
HRP-001	TRAINING AREA 006	0.09	208/1	50	LG PRHR083A	1
HRP-101	LOCKER ROOM 155	0.09	208/1	50	LG PRHR063A	1
HRP-102	CONF ROOM 124	0.06	208/1	50	LG PRHR043A	1
HRP-103	COMM DEVT 114	0.06	208/1	50	LG PRHR043A	1
HRP-104	FINANCE DEPT 107	0.09	208/1	50	LG PRHR083A	1
HRP-105	LEGAL ASSISTANT 106	0.06	208/1	50	LG PRHR033A	1

GENERAL NOTES:
A. PROVIDE ISOLATION BALL VALVES FOR EACH REFRIGERANT BRANCH.
B. SIZE REFRIGERANT PIPING PER MANUFACTURER'S INSTRUCTIONS.

NOTES:
1. UNIT MOUNTED TO BUILDING STRUCTURE.

DIFFUSERS AND GRILLES

TAG NUMBER	TYPE	CFM RANGE MIN	CFM RANGE MAX	INLET SIZE (IN)	FACE SIZE T-BAR (IN)	FACE SIZE HARD LID (IN)	MAX NC	THROW (FT)	MANUFACTURER & MODEL	NOTES
C-1	CEILING SUPPLY DIFFUSER	0	125	6x6	24x24	13x13	12	2-2-5	TITUS PMC	
		126	220	8x8	24x24	15x15	17	2-3-6		
		221	345	10x10	24x24	17x17	21	3-4-8		
		346	500	12x12	24x24	19x19	24	3-5-9		
		501	780	16x16	24x24	23x23	28	4-6-11		
C-2	CEILING RETURN/ EXHAUST GRILLE	0	340	10x10	24x24	12x12	17	-	TITUS PAR	
		341	780	15x15	24x24	17x17	22	-		
		781	1125	18x18	24x24	20x20	24	-		
		1129	1670	22x22	24x24	24x24	26	-		
		1671	3500	22x46	24x48	24x48	25	-		
S-1	CEILING SUPPLY DIFFUSER	0	250	8	48x2	48x2	18	7-10-19	TITUS FLS-SUB	1
		251	280	8	60x2	60x2	17	7-10-20		1

GENERAL NOTES:
A. NOISE CRITERIA (NC) BASED ON ROOM ABSORPTION OF 10 dB, MEASURED PER ANSI/ASHRAE STANDARD 70.
B. THROW VALUES GIVEN FOR TERMINAL VELOCITIES 150, 100, AND 50 FPM FOR ISOTHERMAL CONDITIONS.

NOTES:
1. ONE SLOT.

AIR HANDLING UNIT SCHEDULE

TAG NUMBER				AHU-101	AHU-102
LOCATION				ROOF	ROOF
SERVICE				-	COUNCIL CHAMBER
MIXING BOX	MAX OSA		CFM	3,600	2,000
	CODE MIN OSA		CFM	3,600	760
	MIN OSA		CFM	3,600	760
	LOW MIN OSA		CFM	3,600	760
	PRE-FILTER MERV RATING			8	8
	FINAL FILTER MERV RATING			13	13
SUPPLY FAN	QUANTITY			1	1
	AIRFLOW		CFM	3,600	2,000
	FAN TYPE			PLUG	PLUG
	TSP		(IN. WG.)	3.5	2.1
	ESP		(IN. WG.)	1.4	0.9
	FAN RPM			2,200	2,200
	MOTOR BHP			3.2	1.0
	MOTOR HP			5.0	2.0
	VOLT/PHASE			208/3	208/3
	VFD			YES	YES
RETURN/ RELIEF FAN	QUANTITY			1	1
	AIRFLOW		CFM	3,600	2,000
	FAN TYPE			PLUG	PLUG
	TSP		(IN. WG.)	2.1	0.9
	ESP		(IN. WG.)	0.8	0.5
	FAN RPM			2,200	1,440
	MOTOR BHP			2.0	1.3
	MOTOR HP			3.0	2.0
	VOLT/PHASE			208/3	208/3
	VFD			YES	YES
AIR COOLED CONDENSER FAN	QUANTITY			2	2
	FAN TYPE			PROP	PROP
	MOTOR BHP			0.25	0.25
	MOTOR HP			0.33	0.33
	VOLT/PHASE			208/1	208/1
NATURAL GAS FIRED HEATING COIL	INPUT		(MBH)	195	150
	OUTPUT		(MBH)	156.00	120.00
	CONTROL			4-STAGE	4-STAGE
	EAT		(°F)	47	52
	LAT		(°F)	80	90
DX REFRIGERANT COIL	COOLING	EAT	(°F DB/WB)	82/64	82/64
		LAT	(°F DB/WB)	56/54	54/52
APPROX. WEIGHT			(LBS)	2,400	1,300
MANUFACTURER & MODEL				AAON	AAON
NOTES				1	1

GENERAL NOTES:
A. UNITS MOUNTED ON ROOF CURB
B. MINIMUM OSA CALCULATED BASED ON CODE AND ASHRAE STANDARD 62.1
C. HEATING COILS BASED ON MAXIMUM FACE VELOCITY OF 750 FPM, 0.15 IN WG MAXIMUM AIR PRESSURE DROP, 5FT WG MAXIMUM WATER PRESSURE DROP.
D. COOLING COILS BASED ON MAXIMUM FACE VELOCITY OF 500 FPM, 0.75 IN WG MAXIMUM AIR PRESSURE DROP AND 18 FT WG MAXIMUM WATER PRESSURE DROP.
E. PROVIDE SCCR SUFFICIENT TO MEET THE AVAILABLE FAULT CURRENT AT THE PANELBOARD OR SWITCHBOARD FROM WHICH THE UNIT IS FED. COORDINATE WITH ELECTRICAL DRAWINGS AND ELECTRICAL CONTRACTOR.
F. HEAT RECOVERY SECTION EFFECTIVENESS IS BASED ON AHRI 1060.

NOTES:
1. ARRANGE UNIT FOR SINGLE POINT POWER CONNECTION W/ DISCONNECT SWITCH. PROVIDE A SEPARATE, DEDICATED 120V CONNECTION FOR RECEPTACLE(S) AND LIGHTS.

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SCHEDULES - MECHANICAL

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SPLIT SYSTEM AC UNIT SCHEDULE

TAG NUMBER	LOCATION	SERVICE	TYPE	DX COOLING			ELECTRICAL		MINIMUM EFFICIENCY		APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
				TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EAT (°F DB/WB)	FLA	VOLT/ PHASE	(S)EER	COP			
ACCU-102	ROOF	SERVER ROOM	FLOOR MOUNTED	36	-	-	24	208/1	-	-	207	LG ARUN048GSS4	1
AC-102	SERVER ROOM	SERVER ROOM	WALL MOUNTED	36	-	80/67	13	208/1	14.1	-	50	LG ARNU483B8A4	

GENERAL NOTES:
A. MINIMUM EFFICIENCY IS AT ARI STANDARD CONDITIONS.

NOTES:
1. HEAT RECOVERY TYPE

VRF OUTDOOR UNIT SCHEDULE

TAG NUMBER	LOCATION	SERVICE	TYPE	DX COOLING	DX HEATING	ELECTRICAL		MINIMUM EFFICIENCY		APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
				TOTAL CAPACITY (MBH)	TOTAL CAPACITY (MBH)	FLA	VOLT/ PHASE	(S)EER	COP			
ACCU-101	ROOF	AHU-101	FLOOR MOUNTED	312	351	78.6	208/3	20.5	3.5	666	LG ARUM	1

GENERAL NOTES:
A. MINIMUM EFFICIENCY IS AT ARI STANDARD CONDITIONS.

NOTES:
1. HEAT RECOVERY TYPE

VENTILATION SCHEDULE

AHU-101

LOCATION	FLOOR AREA (SF)	PRIMARY AIRFLOW RATE (CFM)	OCCUPANCY CLASSIFICATION	PEOPLE OUTDOOR AIRFLOW RATE Rp (CFM/PERSON)	AREA OUTDOOR AIRFLOW RATE Ra (CFM/SF)	DEFAULT OCCUPANT DENSITY (PEOPLE/1000SF)	CODE POPULATION	DESIGN POPULATION	OUTDOOR AIRFLOW RATE Vbz (CFM)	ZONE AIR DISTRIBUTION EFFECTIVENESS Ez	OUTDOOR AIR INTAKE Voz (CFM)	NOTES
STORAGE 001	370	75	Storage Rooms	--	0.12	--	0.0	0.0	44.4	0.8	60	
STORAGE 003	595	100	Storage Rooms	--	0.12	--	0.0	0.0	71.4	0.8	90	
VAULT 002	135	25	Storage Rooms	--	0.12	--	0.0	0.0	16.2	0.8	25	
CONF ROOM 004	275	125	Conference rooms	5	0.06	50	13.8	14.0	86.5	0.8	110	
RECORDS STORAGE 005	185	50	Storage Rooms	--	0.12	--	0.0	0.0	22.2	0.8	30	
TRAINING ROOM 006	475	200	Conference rooms	5	0.06	50	23.8	24.0	148.5	0.8	190	
MUSEUM OFFICE 007	235	50	Office spaces	5	0.06	5	1.2	2.0	24.1	0.8	35	
STORAGE 008	385	75	Storage Rooms	--	0.12	--	0.0	0.0	46.2	0.8	50	
STORAGE 009	255	50	Storage Rooms	--	0.12	--	0.0	0.0	30.6	0.8	50	
ELEC 025	80	0	-	-	-	-	-	0.0	-	0.8	-	
OPEN STORAGE 010	2553	200	Corridors	--	0.06	--	0.0	0.0	153.2	0.8	195	
IT STORAGE 023	705	125	Storage Rooms	--	0.12	--	0.0	0.0	84.6	0.8	110	
IT MANAGER 021	100	25	Office spaces	5	0.06	5	0.5	1.0	11.0	0.8	15	
STORAGE 022	60	25	Storage Rooms	--	0.12	--	0.0	0.0	7.2	0.8	10	
IT DEPT 019	680	100	Office spaces	5	0.06	5	3.4	4.0	60.8	0.8	80	
RESTROOM 014	35	0	-	-	-	-	-	0.0	-	0.8	-	
SERVER ROOM 018	175	0	-	-	-	-	-	0.0	-	0.8	-	
STORAGE 017	100	25	Storage Rooms	--	0.12	--	0.0	0.0	12.0	0.8	15	
IT OFFICE 016	200	25	Office spaces	5	0.06	5	1.0	0.0	12.0	0.8	15	
SUMP PUMP 015	70	0	-	-	-	-	-	0.0	-	0.8	-	
STOR 013	35	25	Storage Rooms	--	0.12	--	0.0	0.0	4.2	0.8	10	
ELEV ROOM 012	70	0	-	-	-	-	-	0.0	-	0.8	-	
STOR 011	55	25	Storage Rooms	--	0.12	--	0.0	0.0	6.6	0.8	10	
CITY ADMIN 101	225	50	Office spaces	5	0.06	5	1.1	2.0	23.5	0.8	30	
MAYOR 102	120	25	Office spaces	5	0.06	5	0.6	1.0	12.2	0.8	20	
CITY ATTORNEY 103	185	25	Office spaces	5	0.06	5	0.9	1.0	16.1	0.8	25	
LEGAL ASSISTANT 106	360	50	Office spaces	5	0.06	5	1.8	2.0	31.6	0.8	40	
VAULT 105	140	25	Storage Rooms	--	0.12	--	0.0	0.0	16.8	0.8	25	
CITY RECORDER 104	150	25	Office spaces	5	0.06	5	0.8	1.0	14.0	0.8	20	
FINANCE DEPT 107	1080	50	Office spaces	5	0.06	5	1.1	2.0	74.8	0.8	100	
FINANCE DIRECTOR 109	155	25	Office spaces	5	0.06	5	0.8	1.0	14.3	0.8	20	
ASST CITY ATTORNEY 110	125	25	Office spaces	5	0.06	5	0.6	1.0	12.5	0.8	20	
OFFICE 113	125	25	Office spaces	5	0.06	5	0.6	1.0	12.5	0.8	20	

GENERAL NOTES:
A. SYSTEM OUTDOOR AIR CALCULATION IS BASED ON THE SECTION 403 OF THE 2014 OREGON MECHANICAL SPECIALTY CODE.
B. REFER TO AIR HANDLING UNIT SCHEDULE FOR ACTUAL OUTDOOR AIR FLOW RATE.

NOTES:
1. DESIGN OCCUPANCY REPRESENTS THE AVERAGE OCCUPANCY, WHICH IS NOT LESS THAN 1/2 THE CODE OCCUPANCY.

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VENTILATION SCHEDULE CONT...

AHU-101

LOCATION	FLOOR AREA (SF)	PRIMARY AIRFLOW RATE (CFM)	OCCUPANCY CLASSIFICATION	PEOPLE OUTDOOR AIRFLOW RATE Rp (CFM/PERSON)	AREA OUTDOOR AIRFLOW RATE Ra (CFM/SF)	DEFAULT OCCUPANT DENSITY (PEOPLE/1000SF)	CODE POPULATION	DESIGN POPULATION	OUTDOOR AIRFLOW RATE Vbz (CFM)	ZONE AIR DISTRIBUTION EFFECTIVENESS Ez	OUTDOOR AIR INTAKE Voz (CFM)	NOTES
ACCTG MANAGER 108	105	25	Office spaces	5	0.06	5	0.5	1.0	11.3	0.8	15	
COMM RELATIONS MANAGER 112	130	25	Office spaces	5	0.06	5	0.7	1.0	12.8	0.8	20	
HALLWAY 162	130	25	Corridors	–	0.06	–	0.0	0.0	7.8	0.8	10	
COMM DEVT 114	315	75	Office spaces	5	0.06	5	0.7	8.0	42.8	0.8	55	
COMM DEVT DIRECTOR 115	185	25	Office spaces	5	0.06	5	0.9	1.0	16.1	0.8	25	
COPY 116	120	25	Storage Rooms	–	0.12	–	0.0	0.0	14.4	0.8	20	
SENIOR PLANNER 117	155	25	Office spaces	5	0.06	5	0.8	1.0	14.3	0.8	20	
HALLWAY 118	935	575	Corridors	–	0.06	–	0.0	0.0	56.1	0.8	75	
ELEV LOBBY 127	155	75	Main entry lobbies	5	0.06	10	1.6	8.0	49.3	0.8	65	
HALLWAY 128	155	25	Corridors	–	0.06	–	0.0	0.0	9.3	0.8	15	
RESTROOM 130	110	0	-	-	-	-	-	0.0	-	0.8	-	
HALLWAY 138	440	50	Corridors	–	0.06	–	0.0	0.0	26.4	0.8	35	
ECON DEV DIRECTOR 134	105	25	Office spaces	5	0.06	5	0.5	1.0	11.3	0.8	15	
SUPPORT STAFF 135	235	50	Office spaces	5	0.06	5	1.2	2.0	24.1	0.8	35	
ASST CITY ADMIN 136	235	50	Office spaces	5	0.06	5	1.2	2.0	24.1	0.8	35	
WORK AREA 143	315	100	Cells w/o plumbing fixtures	5	0.12	25	7.9	8.0	77.8	0.8	100	
CHAMBER COMM 149	100	25	Office spaces	5	0.06	5	0.5	1.0	11.0	0.8	15	
PARKS & REC 161	85	25	Office spaces	5	0.06	5	0.4	1.0	10.1	0.8	15	
PARKS & REC 160	125	25	Office spaces	5	0.06	5	0.6	1.0	12.5	0.8	20	
PARKS & REC 159	130	25	Office spaces	5	0.06	5	0.7	1.0	12.8	0.8	20	
COMM COORD 158	180	25	Office spaces	5	0.06	5	0.9	1.0	15.8	0.8	20	
HR ANALYST 157	115	25	Office spaces	5	0.06	5	0.6	1.0	11.9	0.8	15	
HR DIRECTOR 156	230	50	Office spaces	5	0.06	5	1.2	2.0	23.8	0.8	30	
CONF ROOM 120	335	150	Conference rooms	5	0.06	50	16.8	17.0	105.1	0.8	135	
CONF ROOM 124	285	125	Conference rooms	5	0.06	50	14.3	15.0	92.1	0.8	120	
AV ROOM 125	55	0	-	-	-	-	-	0.0	-	0.8	-	
RESTROOM 122	290	0	-	-	-	-	-	0.0	-	0.8	-	
LOCKER ROOM 152	420	0	-	-	-	-	-	0.0	-	0.8	-	
CONF ROOM 142	285	125	Conference rooms	5	0.06	50	14.3	15.0	92.1	0.8	120	
FILES 141	125	25	Storage Rooms	–	0.12	–	0.0	0.0	15.0	0.8	20	
COPIER 140	55	25	Copy, printing rooms	5	0.06	4	0.2	1.0	8.3	0.8	15	
TOTALS:	14313	3575					73	95	1508		2560	

TOTAL AIRFLOW: 3,600
SYSTEM POPULATION: 151

GENERAL NOTES:
A. SYSTEM OUTDOOR AIR CALCULATION IS BASED ON THE SECTION 403 OF THE 2014 OREGON MECHANICAL SPECIALTY CODE.
B. REFER TO AIR HANDLING UNIT SCHEDULE FOR ACTUAL OUTDOOR AIR FLOW RATE.

NOTES:
1. DESIGN OCCUPANCY REPRESENTS THE AVERAGE OCCUPANCY, WHICH IS NOT LESS THAN 1/2 THE CODE OCCUPANCY.

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SCHEDULES - MECHANICAL

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VRF FAN COIL UNIT SCHEDULE

TAG NUMBER	LOCATION	SERVICE	TYPE	COOLING COIL MBH	HEATING COIL MBH	FAN HIGH CFM	FAN LOW CFM	FAN VOLT/ PHASE	MANUFACTURER & MODEL	NOTES
FCU-0-001		IT DEPT 019	VERTICAL	24.0	27.0	710	480	208/1	ARNU243NJA4	
FCU-0-005		CONF ROOM 004	CEILING CASSETTE	11.1	4.0	307	125	208/1	ARNU123TRD4	1,2,3
FCU-0-010		RECORDS STORAGE 005	CEILING CASSETTE	2.8	2.2	265	50	208/1	ARNU053TRD4	
FCU-0-015		TRAINING AREA 006	CEILING CASSETTE	15.7	6.1	656	200	208/1	ARNU183TNA4	1,2,3
FCU-0-020		MUSEUM OFFICE 007	CEILING CASSETTE	6.2	3.4	459	55	208/1	ARNU073TNA4	
FCU-0-025		STORAGE 008	CEILING CASSETTE	3.3	13.0	307	70	208/1	ARNU123TRD4	
FCU-0-030		STORAGE 009	CEILING CASSETTE	3.3	13.0	307	50	208/1	ARNU123TRD4	
FCU-0-035		OPEN STORAGE 010	DUCT HIGH STATIC	3.8	3.2	442	200	208/1	ARNU073BGA4	
FCU-0-040		IT OFFICE 016	CEILING CASSETTE	4.5	4.4	265	50	208/1	ARNU053TRD4	
FCU-1-005		CITY ADMIN 101	DUCT HIGH STATIC	11.1	13.7	339	95	208/1	ARNU123BHA4	
FCU-1-010		MAYOR 102	DUCT HIGH STATIC	6.1	10.4	286	60	208/1	ARNU093BHA4	
FCU-1-015		LEGAL ASSISTANT 106	CEILING CASSETTE	4.5	2.5	265	50	208/1	ARNU053TRD4	
FCU-1-020		FINANCE DEPT 107	DUCT HIGH STATIC	17.4	9.3	562	160	208/1	ARNU183BGA4	
FCU-1-025		FINANCE DIRECTOR 109	CEILING CASSETTE	5.0	5.1	265	50	208/1	ARNU053TRD4	
FCU-1-030		CITY ATTORNEY 110	CEILING CASSETTE	4.5	4.2	265	50	208/1	ARNU053TRD4	
FCU-1-035		OFFICE 113	CEILING CASSETTE	4.5	4.4	265	50	208/1	ARNU053TRD4	
FCU-1-040		ACCTG MANAGER 108	CEILING CASSETTE	1.3	0.3	265	50	208/1	ARNU053TRD4	
FCU-1-045		COMM RELATIONS MANAGER 112	CEILING CASSETTE	1.6	0.4	265	50	208/1	ARNU053TRD4	
FCU-1-050		COMM DEVT 114	DUCT HIGH STATIC	10.2	10.6	339	70	208/1	ARNU123BHA4	
FCU-1-055		COMM DEVT DIRECTOR 115	CEILING CASSETTE	6.7	6.2	459	60	208/1	ARNU073TNA4	
FCU-1-060		COPY 116	CEILING CASSETTE	0.6	2.6	265	50	208/1	ARNU053TRD4	
FCU-1-065		SENIOR PLANNER 117	CEILING CASSETTE	2.4	3.7	265	50	208/1	ARNU053TRD4	
FCU-1-070		HALLWAY 118	DUCT HIGH STATIC	22.8	7.4	671	400	208/1	ARNU243BGA4	
FCU-1-075		HALLWAY 118	DUCT HIGH STATIC	17.9	3.0	562	325	208/1	ARNU183BGA4	
FCU-1-080		ECON DEV DIRECTOR 134	CEILING CASSETTE	2.0	3.0	265	50	208/1	ARNU053TRD4	
FCU-1-085		SUPPORT STAFF 135	DUCT HIGH STATIC	13.6	17.7	540	200	208/1	ARNU153BGA4	
FCU-1-090		ASST CITY ADMIN 136	CEILING CASSETTE	6.7	8.4	459	60	208/1	ARNU073TNA4	
FCU-1-095		CHAMBER COMM 149	CEILING CASSETTE	1.7	2.8	265	50	208/1	ARNU053TRD4	
FCU-1-100		PARKS & REC 160	DUCT HIGH STATIC	7.0	7.1	442	60	208/1	ARNU073BGA4	
FCU-1-105		COMM COORD 158	DUCT HIGH STATIC	10.3	13.2	339	90	208/1	ARNU123BHA4	
FCU-1-110		HR ANALYST 157	DUCT HIGH STATIC	9.0	7.7	449	80	208/1	ARNU093BGA4	
FCU-1-115		CONF ROOM 120	CEILING CASSETTE	12.4	8.8	389	150	208/1	ARNU153TQD4	1,2,3
FCU-1-120		CONF ROOM 124	CEILING CASSETTE	7.4	0.8	283	125	208/1	ARNU093TRD4	1,2,3
FCU-1-125		CONF ROOM 142	DUCT HIGH STATIC	9.5	6.8	339	175	208/1	ARNU123BHA4	1,2,3

GENERAL NOTES:

A. PRIMARY AIR TEMPERATURE 55°F (SUMMER), 65°F (WINTER).

B. AIR PRESSURE DROP THROUGH TERMINAL UNIT TO BE NO GREATER THAN 0.20 IN.WG. WITHOUT COIL OR 0.60 IN.WG. WITH COIL.

NOTES:

1. CO2 SENSOR LOCATED ADJACENT TO THERMOSTAT.
2. OCCUPANCY SENSOR LOCATED WITHIN SPACE.
3. 3-WAY CONTROL VALVE ON REHEAT COIL.

VENTILATION SCHEDULE

AHU-102

LOCATION	FLOOR AREA (SF)	PRIMARY AIRFLOW RATE (CFM)	OCCUPANCY CLASSIFICATION	PEOPLE OUTDOOR AIRFLOW RATE Rp (CFM/PERSON)	AREA OUTDOOR AIRFLOW RATE Ra (CFM/SF)	DEFAULT OCCUPANT DENSITY (PEOPLE/1000SF)	CODE POPULATION	DESIGN POPULATION	OUTDOOR AIRFLOW RATE Vbz (CFM)	ZONE AIR DISTRIBUTION EFFECTIVENESS Ez	OUTDOOR AIR INTAKE Voz (CFM)	NOTES
1-220 COUNCIL CHAMBER	1470	755	Courtrooms	5	0.06	70	103.0	103.0	603.2	0.8	755	
TOTALS:	1470	755					103	103	603		755	

TOTAL AIRFLOW: 2,000
SYSTEM POPULATION: 103

GENERAL NOTES:

A. SYSTEM OUTDOOR AIR CALCULATION IS BASED ON THE SECTION 403 OF THE 2014 OREGON MECHANICAL SPECIALTY CODE.

B. REFER TO AIR HANDLING UNIT SCHEDULE FOR ACTUAL OUTDOOR AIR FLOW RATE.

NOTES:

1. DESIGN OCCUPANCY REPRESENTS THE AVERAGE OCCUPANCY, WHICH IS NOT LESS THAN 1/2 THE CODE OCCUPANCY.

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SCHEDULES - MECHANICAL

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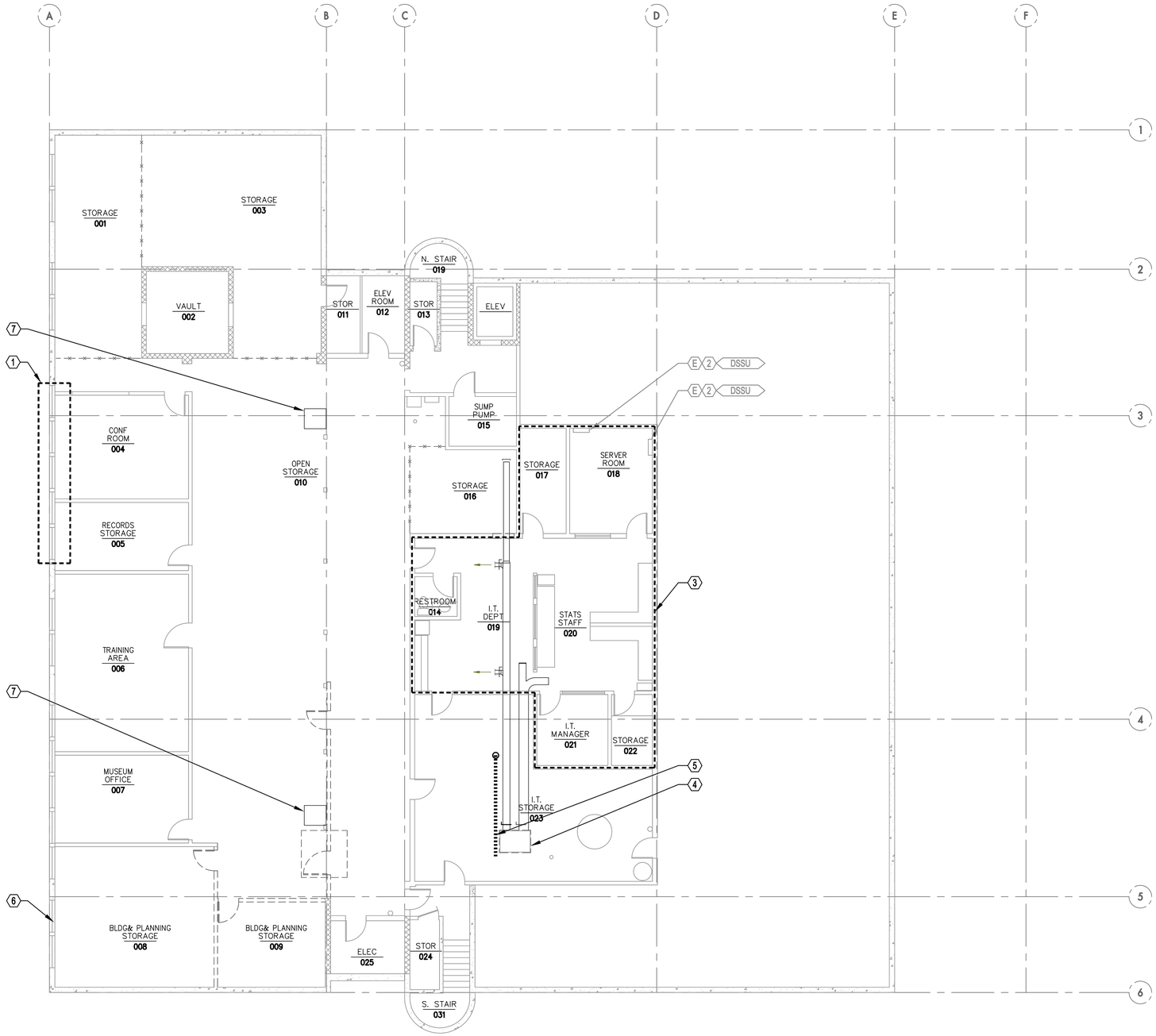

1 / M100 DEMO FLOOR PLAN - BASEMENT - MECHANICAL

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

GENERAL NOTES:

A. ALL EXISTING SUPPLY, RETURN, OUTSIDE AIR AND EXHAUST DUCTWORK, HANGERS, DAMPERS, CONTROLS AND OTHER APPURTENANCES TO BE DEMOLISHED AS INDICATED.

NOTES:

1. EXISTING WINDOW UNITS TO BE DEMOLISHED. COORDINATE WITH ARCHITECTURAL PLANS FOR WINDOW REVISIONS.
2. WALL MOUNTED DUCTLESS SPLIT SYSTEM UNIT TO REMAIN. EXISTING UNITS MUST REMAIN OPERATIONAL THROUGHOUT CONSTRUCTION.
3. IT SUITE EXISTING SUPPLY AND RETURN DUCTWORK AND DIFFUSERS TO REMAIN. EXISTING THERMOSTATS SERVING ROOMS TO BE DEMOLISHED.
4. EXISTING IT SUITE AHU TO BE DEMOLISHED. EXISTING SUPPLY AND RETURN DUCTWORK MAINS SHALL BE REUSED FOR FUTURE AHU CONNECTION. DEMOLISH AS MUCH EXISTING DUCTWORK AS NEEDED TO MAKE PROPER FIELD CONNECTIONS TO NEW UNIT.
5. EXISTING OUTSIDE AIR DUCT TO BE DEMOLISHED FROM CONNECTION TO IT SUITE AHU TO INTAKE VENT AT THE ROOF.
6. EXISTING SUPPLY AND RETURN GRILLES AND DUCTWORK TO BE DEMOLISHED. FIELD VERIFY LOCATION PRIOR TO COMMENCING WORK.
7. EXISTING CEILING MOUNTED HEATERS TO BE DEMOLISHED.

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BASEMENT DEMO PLAN - MECHANICAL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
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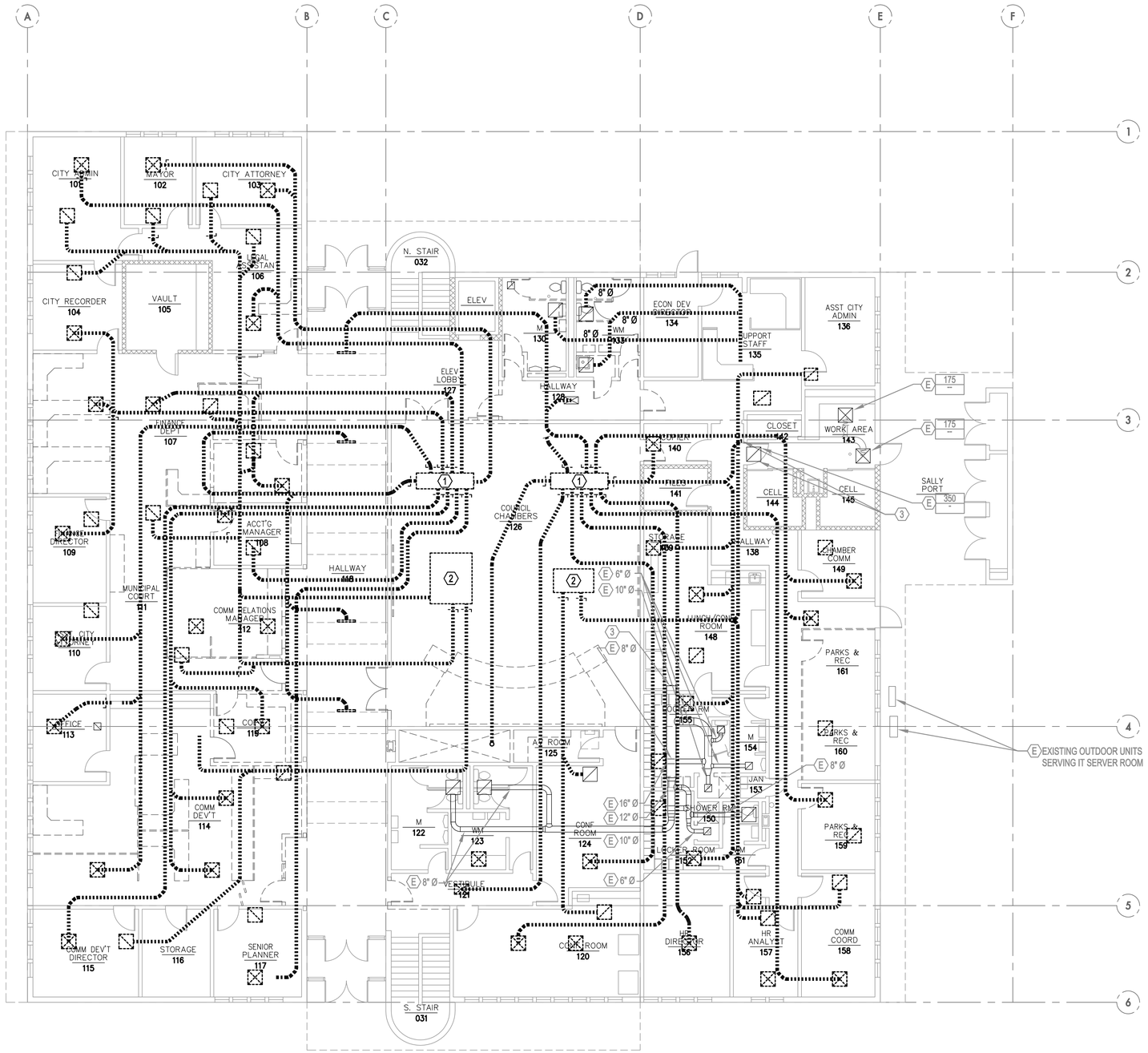

1 M101 DEMO FLOOR PLAN - GROUND LEVEL - MECHANICAL

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

N

GENERAL NOTES:

A. UNLESS OTHERWISE NOTED, ALL EXISTING SUPPLY AND RETURN DUCTWORK, DIFFUSERS, HANGERS, DAMPERS AND OTHER APPURTENANCES TO BE DEMOLISHED.

B. UNLESS OTHERWISE NOTED, ALL EXISTING EXHAUST DUCTWORK, GRILLES, HANGERS, DAMPERS AND OTHER APPURTENANCES TO BE DEMOLISHED.

C. ALL EXISTING CONTROLLERS, THERMOSTATS, WIRING AND OTHER CONTROL ACCESSORIES TO BE DEMOLISHED.

⬡ NOTES:

1. SUPPLY DUCT RISERS UP THROUGH ROOF TO BE DEMOLISHED.
2. RETURN DUCT RISERS UP THROUGH ROOF TO BE DEMOLISHED.
3. EXISTING SUPPLY GRILLES AND DUCTWORK TO BE RECONNECTED TO NEW HVAC SYSTEM.
4. EXISTING DUCTWORK IN THE SHAFT TO BE DEMOLISHED.

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GROUND FLOOR DEMO PLAN - MECHANICAL

Scale	1/8" = 1'-0"
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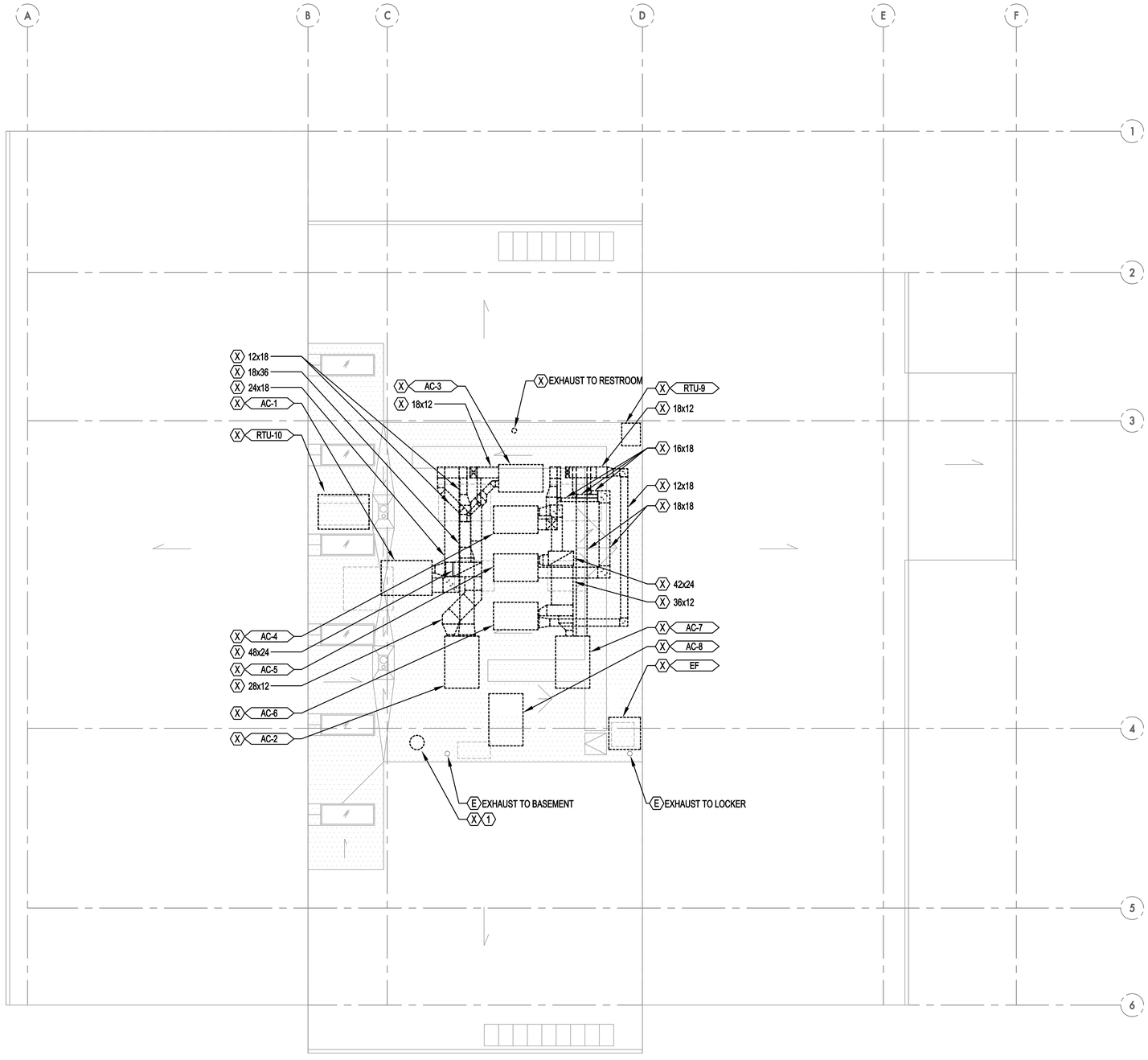

1 / M102 DEMOLITION PLAN - ROOF - MECHANICAL

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

GENERAL NOTES:

A. ALL EXISTING ROOFTOP UNITS, EXHAUST FANS, DUCTWORK, DOG HOUSES, SUPPORT HANGERS, ROOF CURBS, AND ANY OTHER APPURTENANCES TO BE DEMOLISHED.

NOTES:

1. EXISTING CARRIER 38QN030340 CONDENSER TO BE DEMOLISHED

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ROOF DEMOPLAN - MECHANICAL

Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
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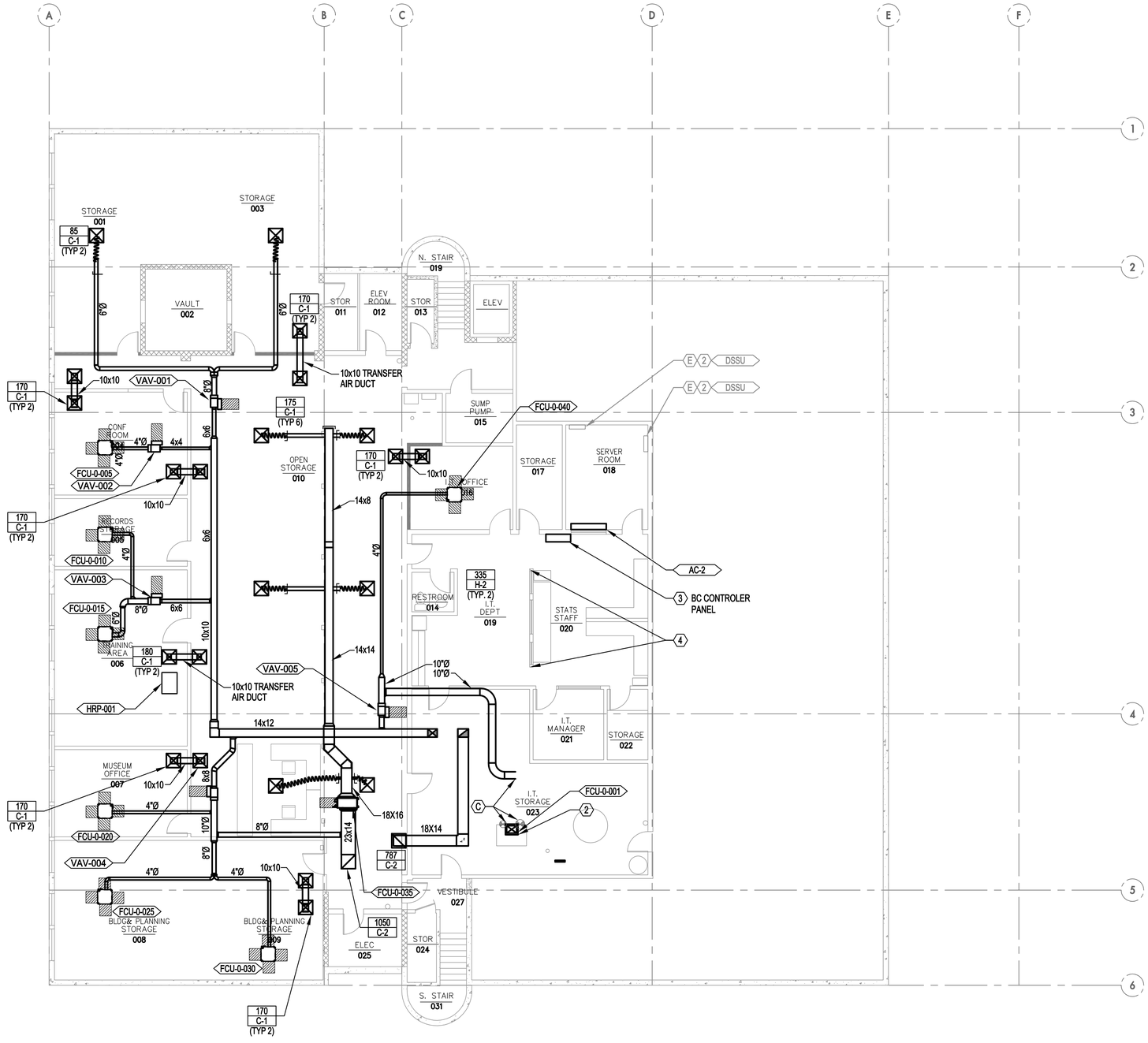

1 M200 FLOOR PLAN - BASEMENT - MECHANICAL

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

N

GENERAL NOTES:

A. ALL CONDENSATE PIPING FROM VRF UNITS TO BE CONNECTED AND ROUTE TO EXISTING SUP BASIN IN IT STORAGE ROOM AT COLUMN D/5.

NOTES:

1. NOT USED
2. INSTALL NEW VRF FCU IN SAME LOCATION AS DEMOLISHED IT SUITE VERTICAL HEAT PUMP. MODIFY SUPPLY/RETURN DUCTWORK AS NEEDED FOR PROPER UNIT CONNECTION. UNIT SHALL UTILIZE EXISTING DUCT INFRASTRUCTURE ABOVE I.T. SUITE CEILING.
3. CONTRACTOR TO PROVIDE SINGLE VRF SYSTEM CONTROL PANEL WITH LCD DISPLAY TO CONTROL ALL VRF SYSTEM EQUIPMENT. VRF CONTROL SYSTEM TO BE PROVIDED WITH BACNET CONTROLS INTERFACE. ALL EQUIPMENT TO BE CONNECTED TO EXISTING AUTOMATED LOGIC CONTROLS NETWORK.
4. EXISTING DIFFUSER IN SOFFIT TO BE DEMOLISHED.

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BASEMENT FLOOR PLAN - MECHANICAL

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Date DECEMBER 14, 2018
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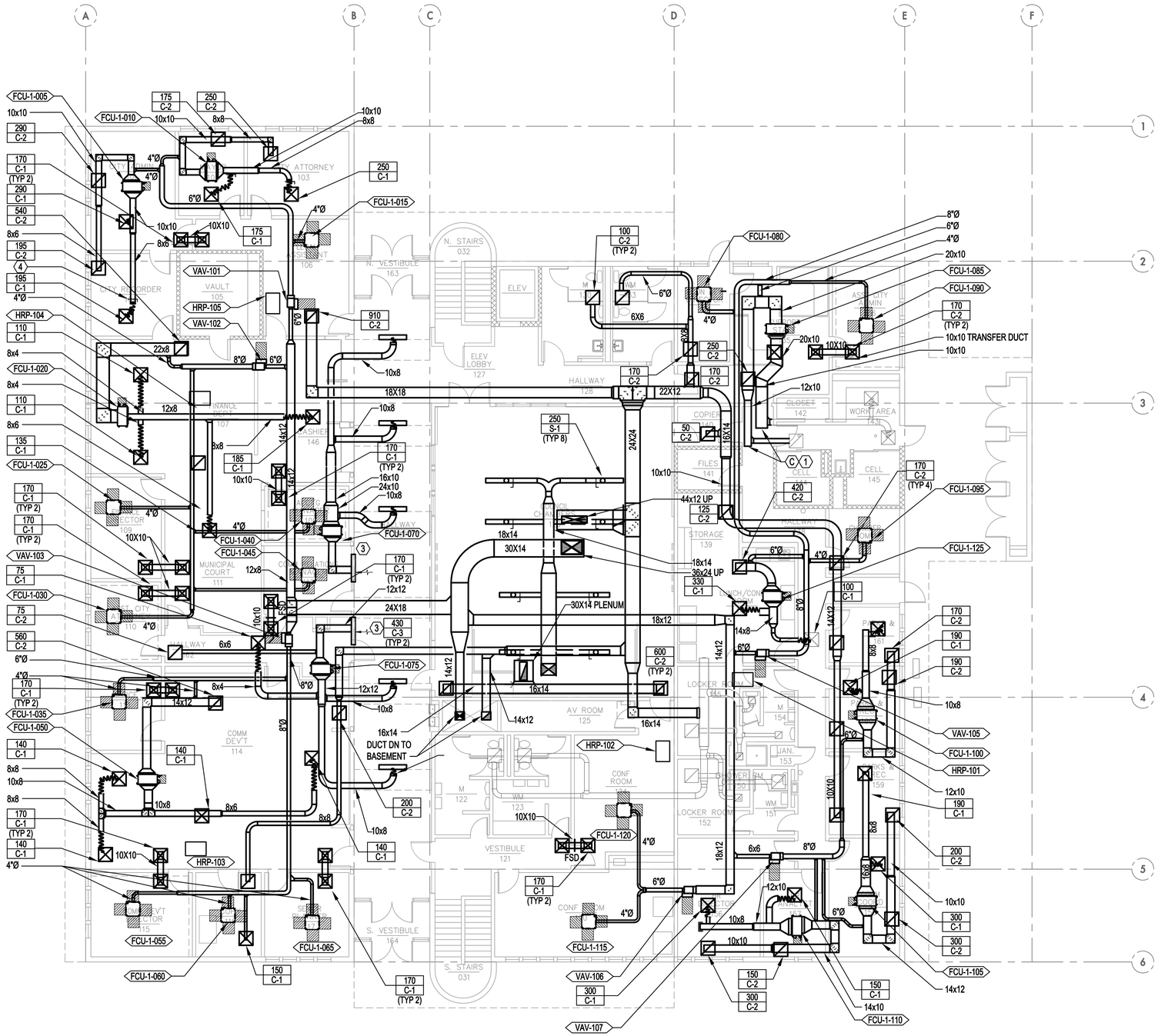

1 M201 FLOOR PLAN - GROUND LEVEL - MECHANICAL

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

GENERAL NOTES:

A. ALL CONDENSATE PIPING FROM VRF UNITS TO BE CONNECTED AND ROUTED TO SHAFT BEHIND COUNCIL CHAMBER ROOM, DOWN TO BASEMENT LEVEL AND TO EXISTING SUMP BASIN IN IT STORAGE ROOM AT COLUMN D/5.

NOTES:

1. EXISTING SUPPLY GRILLES AND DUCTWORK TO BE RECONNECTED TO NEW HVAC SYSTEM.
2. NEW SUPPLY GRILLES TO BE RECONNECTED AT SAME LOCATION OF EXISTING GRILLES. EXISTING GRILLES TO BE REMOVED.
3. RETURN GRILLES AT THESE LOCATIONS TO BE LOCATED 18" ABOVE SOFFIT.
4. BALANCE VOLUME DAMPERS TO INSTALLED AT LOW PRESSURE DUCTWORK BRANCHES PER SECTION 233300.

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GROUND FLOOR PLAN - MECHANICAL

Scale	1/8" = 1'-0"
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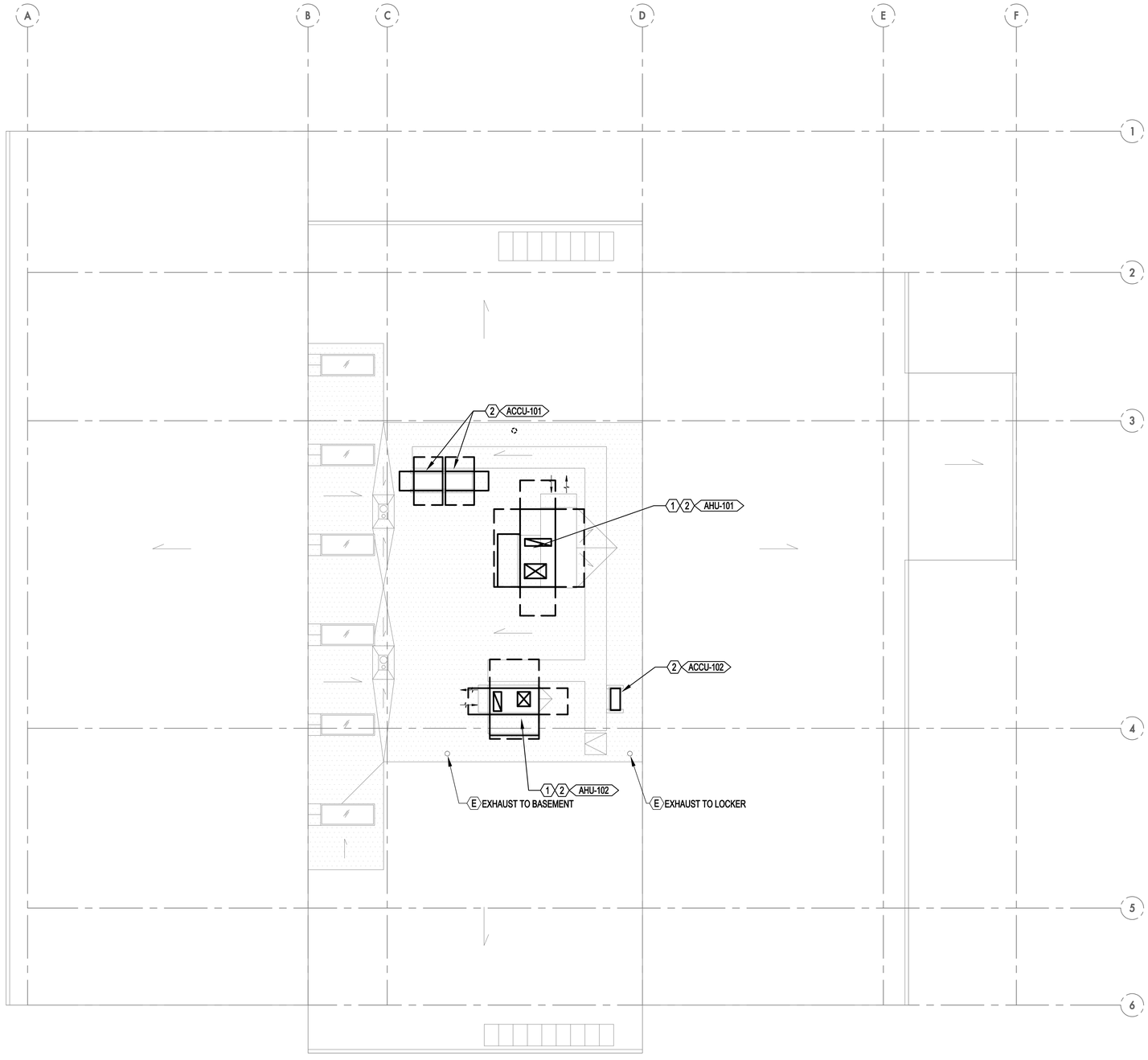

1 / M202 FLOOR PLAN - ROOF - MECHANICAL
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

A. INSTALL AIR HANDLING UNIT ON 24" ROOF CURB. COORDINATE EXACT LOCATION AND DETAILS WITH ARCHITECTURAL DRAWINGS.

B. INSTALL VRF CONDENSING UNITS ON 12" PREFABRICATED RAIL CURB. COORDINATE EXACT LOCATION AND DETAILS WITH ARCHITECTURAL DRAWINGS.

NOTES:

1. ROUTE SUPPLY AND RETURN DUCTWORK FROM AHU BETWEEN EXISTING TRUSSES WITHOUT REFRAMING EXISTING STRUCTURE. CONTRACTOR SHALL TRANSITION DUCTWORK AS NECESSARY FROM AHU CONNECTION SIZE.

2. ROUTE AHU CONDENSATE TO DISCHARGE ON ROOF DECK OR APPROVED RECEPTACLE.

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ROOF PLAN - MECHANICAL

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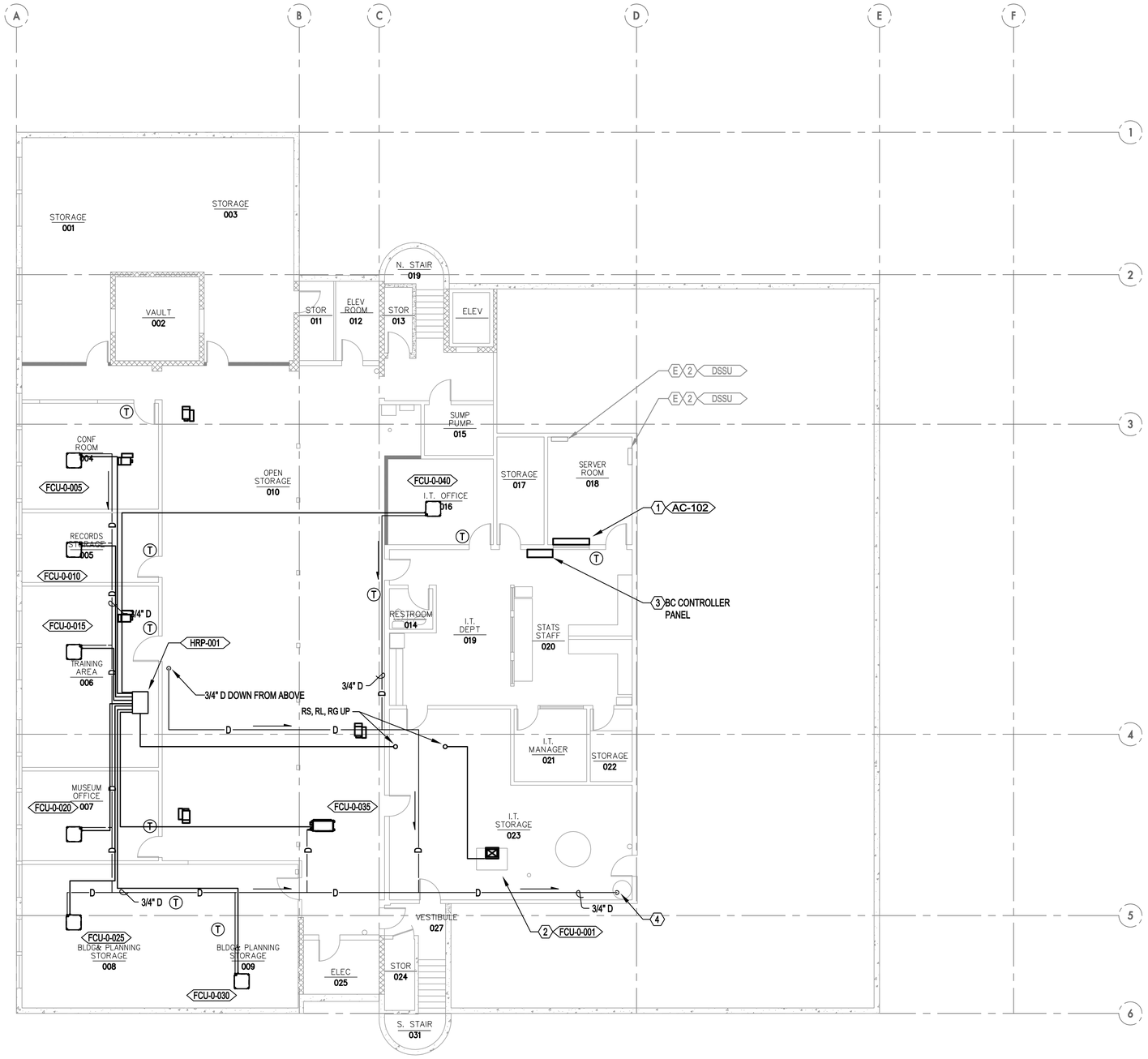

1 / M200 FLOOR PLAN - BASEMENT - MECHANICAL PIPING

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

GENERAL NOTES:

A. REFER TO MANUFACTURER RECOMMENDATIONS FOR VRF PIPE SIZING.
B. ALL CONDENSATE DRAIN PIPING TO BE 3/4" Ø UNLESS NOTED OTHERWISE.

NOTES:

1. INSTALL WALL MOUNTED DUCTLESS SPLIT SYSTEM ABOVE WINDOW IN SERVER ROOM. ROUTE REFRIGERANT PIPING UP TO CONDENSER UNIT ON ROOF. ROUTE CONDENSATE PIPING TO SUMP IN STORAGE ROOM 017.
2. INSTALL NEW VRF FCU IN SAME LOCATION AS DEMOLISHED IT SUITE VERTICAL HEAT PUMP. MODIFY SUPPLY/RETURN DUCTWORK AS NEEDED FOR PROPER UNIT CONNECTION. UTILIZE EXISTING DUCTWORK FOR DISTRIBUTION OF AIR.
3. PROVIDE SINGLE VRF SYSTEM CONTROL PANEL WITH LCD DISPLAY AND BACNET CONTROL INTERFACE TO CONTROL VRF SYSTEM EQUIPMENT. CONNECT TO EXISTING AUTOMATED LOGIC CONTROLS NETWORK.
4. ROUTE CONDENSATE PIPING DOWN TO EXISTING FLOOR DRAIN.
5. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR LOCATION OF EXISTING GRILLES IN SOFFIT TO BE DEMOLISHED. EXTEND DUCTWORK TO EDGE OF SOFFIT AND PROVIDE NEW GRILL AT EDGE OF SOFFIT.

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MATTHEW A. PEARS
EXPIRES 12-31-2018
12/14/2018

WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

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Woodburn, OR 97071

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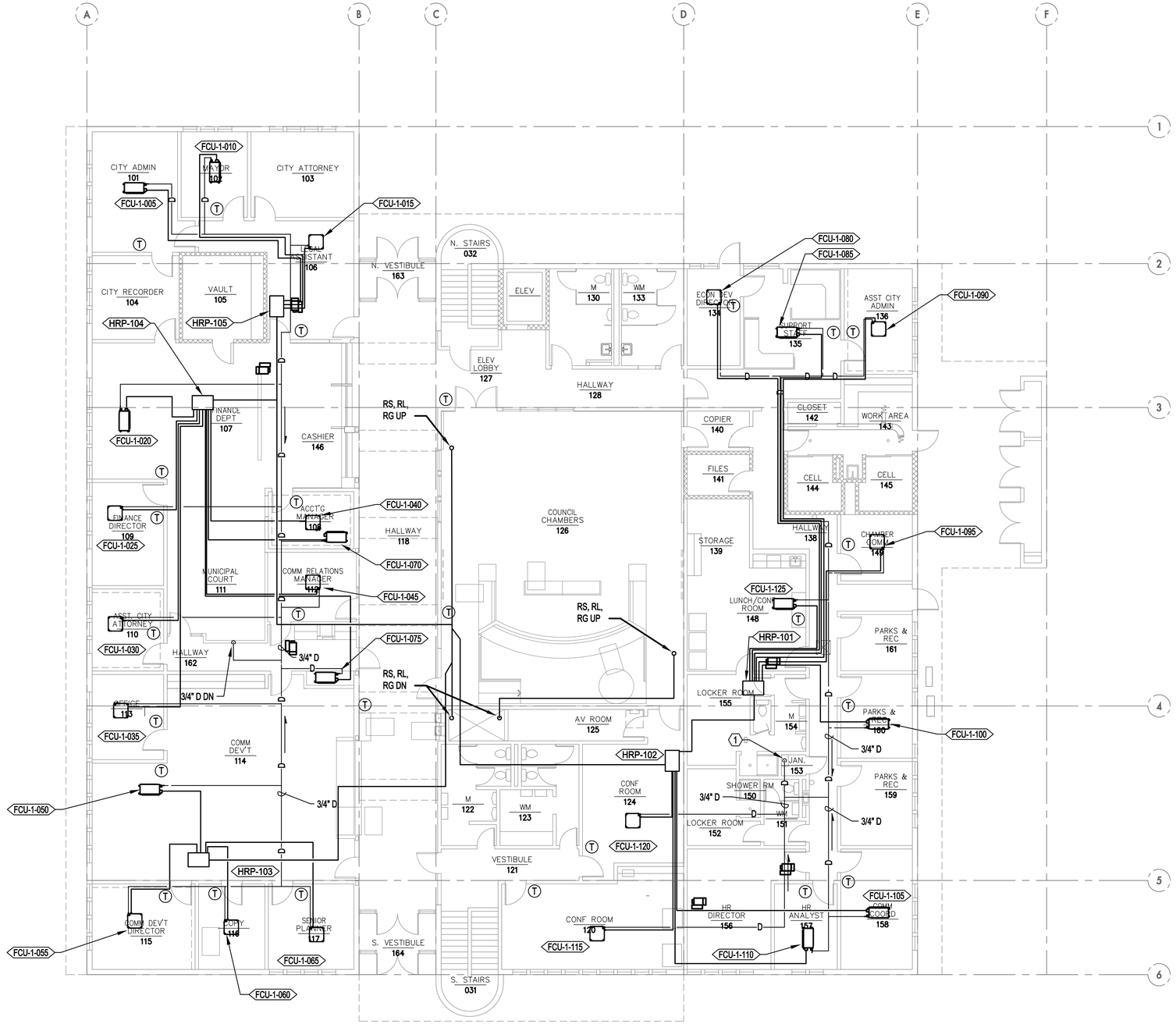
Issue	Revision	Date
100% CD		12/14/18

BASEMENT FLOOR PLAN - MECHANICAL PIPING

Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
Sheet No.	M300



1 M201 FLOOR PLAN - GROUND LEVEL - MECHANICAL PIPING

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

N

GENERAL NOTES:

A. REFER TO MANUFACTURER RECOMMENDATIONS FOR VRF PIPE SIZING.

B. ALL CONDENSATE DRAIN PIPING TO BE 3/4" Ø UNLESS NOTED OTHERWISE.

NOTES:

1. CONDENSATE DRAIN PIPING DOWN TO MOP SINK.

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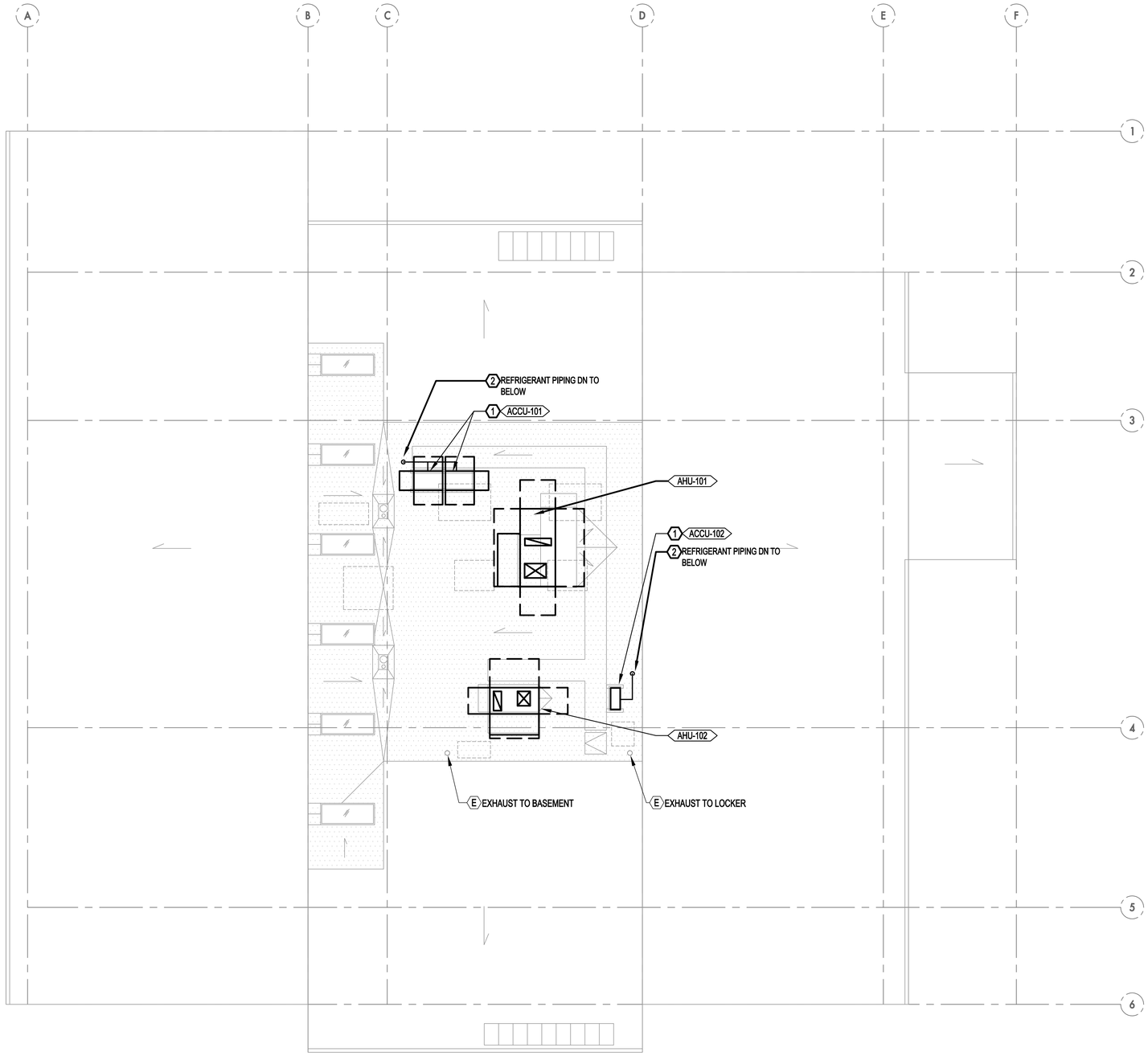
GROUND FLOOR PLAN - MECHANICAL PIPING

Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
Sheet No.	M301



1 / M202 FLOOR PLAN - ROOF - MECHANICAL PIPING

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

GENERAL NOTES:

A. AIR HANDLING UNITS SHALL BE INSTALLED ON 12" ROOF CURB. COORDINATE EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

B. VRF CONDENSING UNITS SHALL BE INSTALLED ON 12" PREFABRICATED RAIL CURB. COORDINATE EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

C. REFER TO MANUFACTURER RECOMMENDATIONS FOR VRF PIPE SIZING.

⬡ NOTES:

1. ROUTE VRF REFRIGERANT PIPING ALONG ROOF TO ROOF PIPE PENETRATION. COORDINATE EXACT LOCATION WITH ARCHITECTURAL DRAWINGS. PIPING SHALL BE FULLY INSULATED AND SUPPORTED WITH PIPE STANDS AT 5' INTERVALS PER MANUFACTURER'S INSTRUCTIONS.

2. REFRIGERANT PIPING DOWN THROUGH PRE-FABRICATED ROOF CURB.

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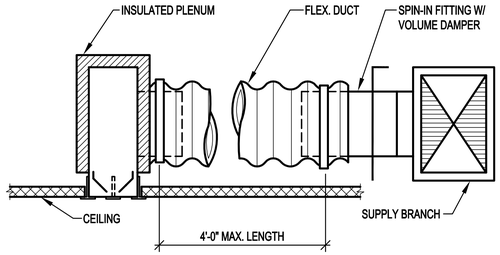
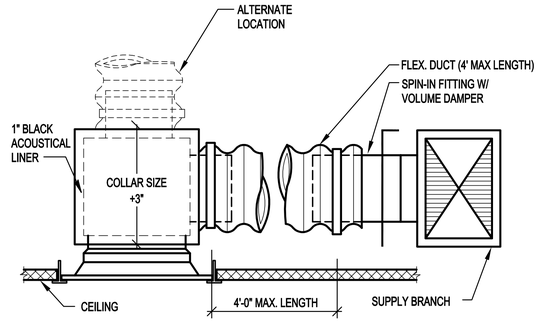
ROOF PLAN - MECHANICAL PIPING

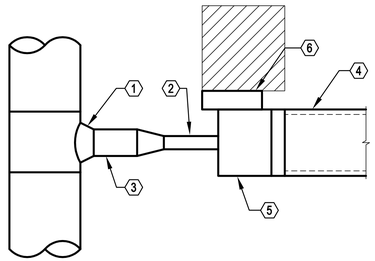
Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
Sheet No.	M302



4 M501 TYPICAL SLOT DIFFUSER
SCALE: NONE



1 M501 TYPICAL SQUARE NECK T-BAR DIFFUSER
SCALE: NONE



NOTES:

1. CONICAL TEE.

2. INLET DUCT. MINIMUM STRAIGHT LENGTH = 3'-0", DUCT SIZE TO BE SAME SIZE AS TERMINAL UNIT INLET. FLEXIBLE DUCT CONNECTIONS ARE NOT ALLOWED.

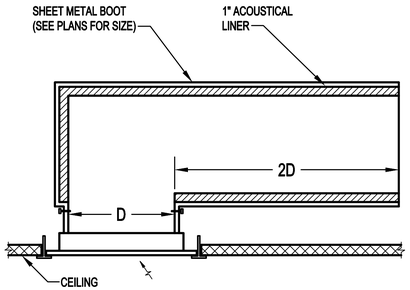
3. BRANCH DUCT. IF UNDER 10'-0" IN LENGTH, DUCT SIZE TO BE SAME SIZE AS TERMINAL UNIT INLET. IF LENGTH IS 10'-0" OR OVER, DUCT SIZE TO BE AS SHOWN ON PLAN.

4. DISCHARGE DUCT TO BE 1" LINED SHEET METAL, MINIMUM 8'-0" LONG, SAME SIZE AS TERMINAL UNIT OUTLET, OR AS SHOWN ON PLAN, WHICHEVER IS LARGER.

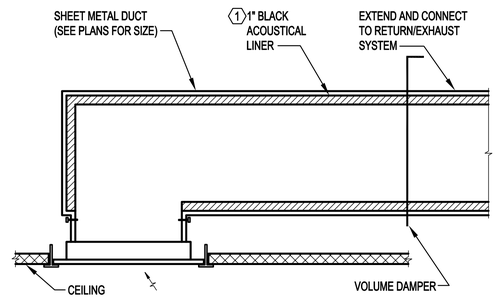
5. TERMINAL UNIT.

6. CONTROL ENCLOSURE. PROVIDE 36" CLEARANCE DIRECTLY IN FRONT OF ENCLOSURE, MOUNT CONTROLS AND PIPING CONNECTIONS ON SAME SIDE OF UNIT.

5 M501 TYPICAL TERMINAL UNIT
SCALE: NONE



2 M501 RETURN AIR BOOT
SCALE: NONE



3 M501 DUCTED RETURN/EXHAUST GRILLE
SCALE: NONE

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DETAILS- MECHANICAL

Scale N.T.S.
Date DECEMBER 14, 2018
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STANDARD PLUMBING ABBREVIATIONS

AD	AREA DRAIN
AFF	ABOVE FINISHED FLOOR
AHP	APPARATUS HOUSING PLENUM
ALT	ALTERNATIVE
AL	ALUMINUM
AP	ACCESS PANEL
APPROX	APPROXIMATELY
ARCH	ARCHITECT(URAL)
AUTO	AUTOMATIC
BLDG	BUILDING
BOP	BOTTOM OF PIPE
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
BV	BALANCING VALVE
CALC	CALCULATION
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CLG	CEILING OR COOLING
CL	CENTERLINE
CO	CLEAN OUT
CONC	CONCRETE
CONN	CONNECT(ION)
CONT	CONTINUE(ED)(UATION)
CP	CIRCULATING PUMP
CI	CAST IRON
CTG	CLEANOUT TO GRADE
CV	CHECK VALVE
DF	DRINKING FOUNTAIN
DFU	DRAINAGE FIXTURE UNIT
DI	DEIONIZER
DIA	DIAMETER
DN	DOWN
DR	DRAIN
DROP	DROP (WITHIN FLOOR)
DWG	DRAWING
(E)	EXISTING
EDR	EXPRESS DRAIN RISER
EFF	EFFICIENCY
ELEC	ELECTRIC(AL)
ELEV	ELEVATION
ENGR	ENGINEER
EQ	EQUAL
EQUIP	EQUIPMENT
ET	EXPANSION TANK
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EXIST	EXISTING
EXP	EXPANSION
F	DEGREES FAHRENHEIT
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDC	FIRE DEPARTMNET CONNECTION
FHC	FIRE HOSE CABINET
FHV	FIRE HOSE VALVE
FHVC	FIRE HOSE VALVE CABINET
FILT	FILTER
FL	FLOOR
FLEX	FLEXIBLE
FP	FIRE PUMP
FPD	FLUID PRESSURE DROP
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOW SWITCH
FSK	FLOOR SINK
FT	FEET/FOOT
FU	FIXTURE UNIT
FUT	FUTURE
GA	GAGE/GAUGE
GAL	GALLON
GALV	GALVANIZED
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GATE VALVE
H	HEIGHT
HB	HOSE BIBB
HD	HUB DRAIN
HORIZ	HORIZONTAL
HP	HORSEPOWER
HT	HEAT TRACE
ID	INSIDE(DIAMETER/DIMENSION)
IE	INVERT ELEVATION
IN	INCH(ES)
INSUL	INSULATION
JP	JOCKEY PUMP
JS	JANITOR SINK
KW	KILOWATT
KWH	KILOWATT HOUR
L	LAVATORY
LB	POUND
LF	LINEAR FEET
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MS	MOP SINK
MTD	MOUNTED
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
OC	ON CENTER DISTANCE
OD	OVERFLOW DRAIN
OS&Y	OUTSIDE SCREW & YOKE GATE VALVE
PD	PLANTER DRAIN
P/FT	PITCH PER FOOT
PG	PRESSURE GAUGE
PH	PHASE
PIV	POST INDICATING VALVE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH (GAUGE)
R (RAD)	RADIUS
RISE	RISE (WITHIN FLOOR)
RD	ROOF DRAIN
REV	REVISION
RPM	REVOLUTIONS PER MINUTE
SA	SHOCK ABSORBER
SAD	SEE ARCHITECTURAL
SE	SEWAGE EJECTOR
SECT	SECTION
SF	SQUARE FEET
SH	SHOWER
SIM	SIMILAR
SK	SINK
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SS	SERVICE SINK
SQ	SQUARE
SQ IN	SQUARE INCH(ES)
STL	STEEL
STRUCT	STRUCTUR(E)(AL)
TDH	TOTAL DISCHARGE HEAD
TEMP	TEMPERATURE
TMV	TEMPERATURE MIXING VALVE
TOP	TOP OF PIPE
TPV	TRAP PRIMER VALVE
TS	TAMPER SWITCH
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UP	UP (PENETRATES FLOOR SLAB)
UR	URNIAL
V	VOLTS
VB	VOLUME BREAKER
VEL	VELOCITY
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THROUGH ROOF
W	WIDTH
WC	WATER CLOSET
WCO	WALL CLEANOUT
WFU	WATER FIXTURE UNITS
WG	WATER GAUGE
W/	WITH
W/O	WITHOUT
ZONE	ZONE

FIRE PROTECTION SYMBOLS

- FP — FIRE PROTECTION
- SPR — FIRE SPRINKLER
- DP — DRY PIPE SPRINKLER
- PA — PRE-ACTION SYSTEM
- WSP — WET STANDPIPE
- DSP — DRY STANDPIPE
- FDC — FIRE DEPARTMENT CONNECTION
- SRC — STANDPIPE ROOF CONNECTION
- SO — STANDPIPE OUTLET
- UPRIGHT SPRINKLER HEAD
- PENDANT SPRINKLER HEAD
- SIDEWALL SPRINKLER HEAD
- F — FLOW SWITCH
- S — SUPERVISED SHUT-OFF VALVE
- DPV — DRY PIPE VALVE ASSEMBLY
- PAV — PRE-ACTION VALVE ASSEMBLY

FIRE PROTECTION PIPING

FSP	FSP	FIRE STANDPIPE
FP	FP	FIRE PROTECTION
SPR	SPR	FIRE SPRINKLER
DP	DP	DRY PIPE SPRINKLER
PA	PA	PRE-ACTION SYSTEM
WSP	WSP	WET STANDPIPE
DSP	DSP	DRY STANDPIPE
DR	DR	SPRINKLER DRAIN PIPING

DEMOLITION LEGEND

- REMOVE EXISTING PIPE

NEW AND EXISTING WORK

- EXISTING PIPING
- NEW PIPING

SYMBOLS

A	ACCESS PANEL	K	CAP EXISTING / CAP FOR FUTURE
B	BELOW GRADE / FLOOR	R	RELOCATE EXISTING
C	CONNECT TO EXISTING	X	REMOVE EXISTING
E	EXISTING TO REMAIN	#	NUMBERED NOTE

1 — REVISION NUMBER

ET - XXX
- UNIT NUMBER
- FLOOR UNIT IS LOCATED ON
- EQUIPMENT TYPE

EQUIPMENT

- DETAIL NUMBER
- DWG. SHEET NO.

DETAIL CALLOUT

- SYSTEM TYPE
- RISER NUMBER

RISER TAG

MISC. FITTINGS & SYMBOLS

- DIRECTION OF FLOW
- DIRECTION OF SLOPE
- PIPE SLEEVE
- REDUCER
- ANCHOR
- ELBOW (90°)
- ELBOW (45°)
- TEE
- CROSS
- PIPING CONNECTIONS
- JOINT OR COUPLING POINT
- UNION
- FLANGED CONNECTION
- CAP
- PLUG OR BLIND FLANGE
- RISER
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- HORIZONTAL TEE
- FLEXIBLE CONNECTION
- BALL JOINT
- MC — MECHANICAL COUPLING
- HEAT TRACE
- PIPE CONTINUATION

GENERAL NOTE

THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

MISC. VALVES & COCKS

- SHUT-OFF VALVE
- GLOBE VALVE
- S — SHUT-OFF VALVE W/ TAMPER SWITCH
- TRIPLE DUTY VALVE
- CHECK VALVE
- 2-WAY CONTROL VALVE
- 3-WAY CONTROL VALVE
- BALANCING VALVE
- FC — FLOW CONTROL VALVE
- S — SOLENOID VALVE
- PRESSURE REDUCING VALVE
- MAV — AIR VENT MANUAL
- AAV — AIR VENT AUTOMATIC
- ANGLE RELIEF VALVE
- STRAINER
- STRAINER WITH BLOWDOWN
- DV — DRAIN VALVE
- HB — HOSE BIBB
- WH — WALL HYDRANT
- G GH — GROUND HYDRANT
- F&T/IB — STEAM TRAP
- P — PRESSURE GAUGE
- PRESSURE/TEMPERATURE TEST PLUG
- T — THERMOMETER
- F — FLOW SWITCH
- T — TEMPERATURE TRANSMITTER
- S (SIZE) — SHOCK ARRESTOR
- V — VACUUM BREAKER
- WFM — WATER FLOW METER
- RPBA — REDUCED PRESSURE BACKFLOW ASSEMBLY
- DCVA — DOUBLE CHECK VALVE ASSEMBLY
- DCDA — DOUBLE CHECK DETECTOR ASSEMBLY
- BWV — BACKWATER VALVE
- UG — UNDERGROUND GATE VALVE W/BOX
- PIV — UNDERGROUND GATE W/POST INDICATOR
- OUTSIDE SCREW & YOKE
- Y PATTERN BOILER BLOWDOWN VALVE
- NON-RETURN STOP VALVE
- QUICK OPENING BOILER BLOWDOWN VALVE
- GAS COCK VALVE
- RELIEF VALVE
- MIXING VALVE
- PUMP

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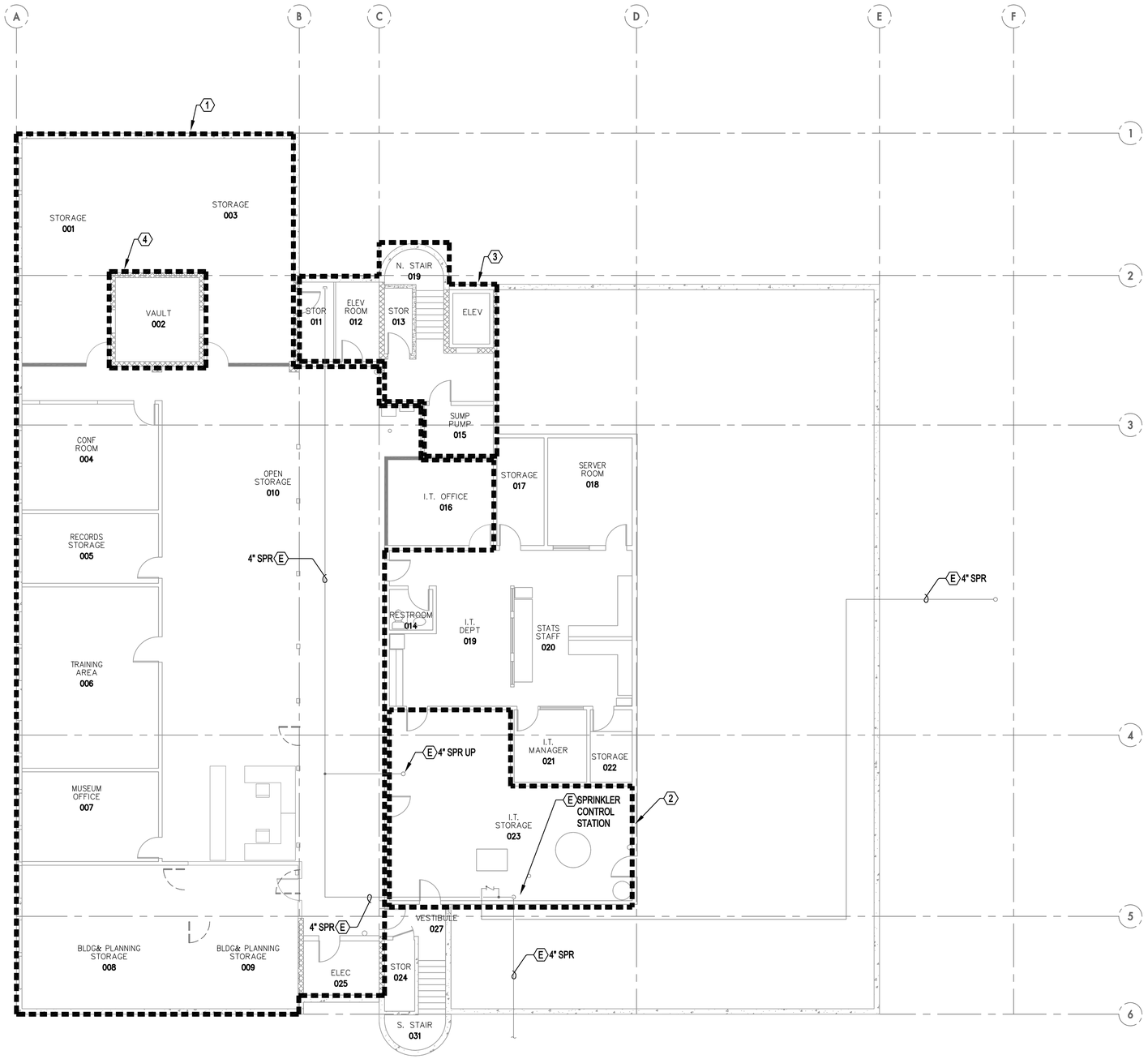
SYMBOLS, LEGENDS & ABBREVIATIONS - FIRE PROTECTION

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. FP001



1 FP200 FLOOR PLAN - BASEMENT - FIRE PROTECTION

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

GENERAL NOTES:

A. VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. PRIOR TO PROCEEDING WITH WORK, NOTIFY THE ARCHITECT ABOUT ANY DISCREPANCIES BETWEEN DESIGN DOCUMENTS AND FIELD CONDITIONS.
B. PATCH AND REPAIR ALL OPENINGS MADE BY REMOVALS/DEMOLITION.
C. AFTER COMPLETING DEMO WORK, VERIFY THAT ALL SERVICES TO THE AREAS NOT INCLUDED IN THE DEMO WORK SCOPE AREA ARE FUNCTIONAL.

⬡ NOTE:

1. REVISE SPRINKLER HEAD LOCATIONS AND PIPING LAYOUT TO PROVIDE TOTAL COVERAGE PER NFPA 13. COORDINATE NEW SPRINKLER HEAD LOCATIONS WITH ARCHITECTURAL CEILING PLANS AND CEILING MOUNTED DEVICES AND DIFFUSERS. COORDINATE SPRINKLER TYPES (PENDANT VS UPRIGHT) IN AREAS WHERE CEILINGS HAVE BEEN REMOVED OR WHERE CEILINGS HAVE CHANGED. PROVIDE NEW SPRINKLER HEADS AS REQUIRED AND CONNECT TO EXISTING PLUMBING MAINS.
2. EXISTING FIRE PROTECTION TO BE DEMOLISHED AND REPLACED WITH LIKE FOR LIKE SPRINKLER PIPING AND SPRINKLER HEADS.
3. MODIFY EXISTING SPRINKLER LAYOUT IN ROOM, PROVIDE NEW SPRINKLERS AS REQUIRED TO PROVIDE COVERAGE IN ACCORDANCE WITH NFPA 13.
4. EXISTING FIRE PROTECTION SPRINKLER HEADS AND PIPING IN ROOM TO REMAIN.

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BASEMENT FLOOR PLAN - FIRE PROTECTION

Scale	1/8" = 1'-0"
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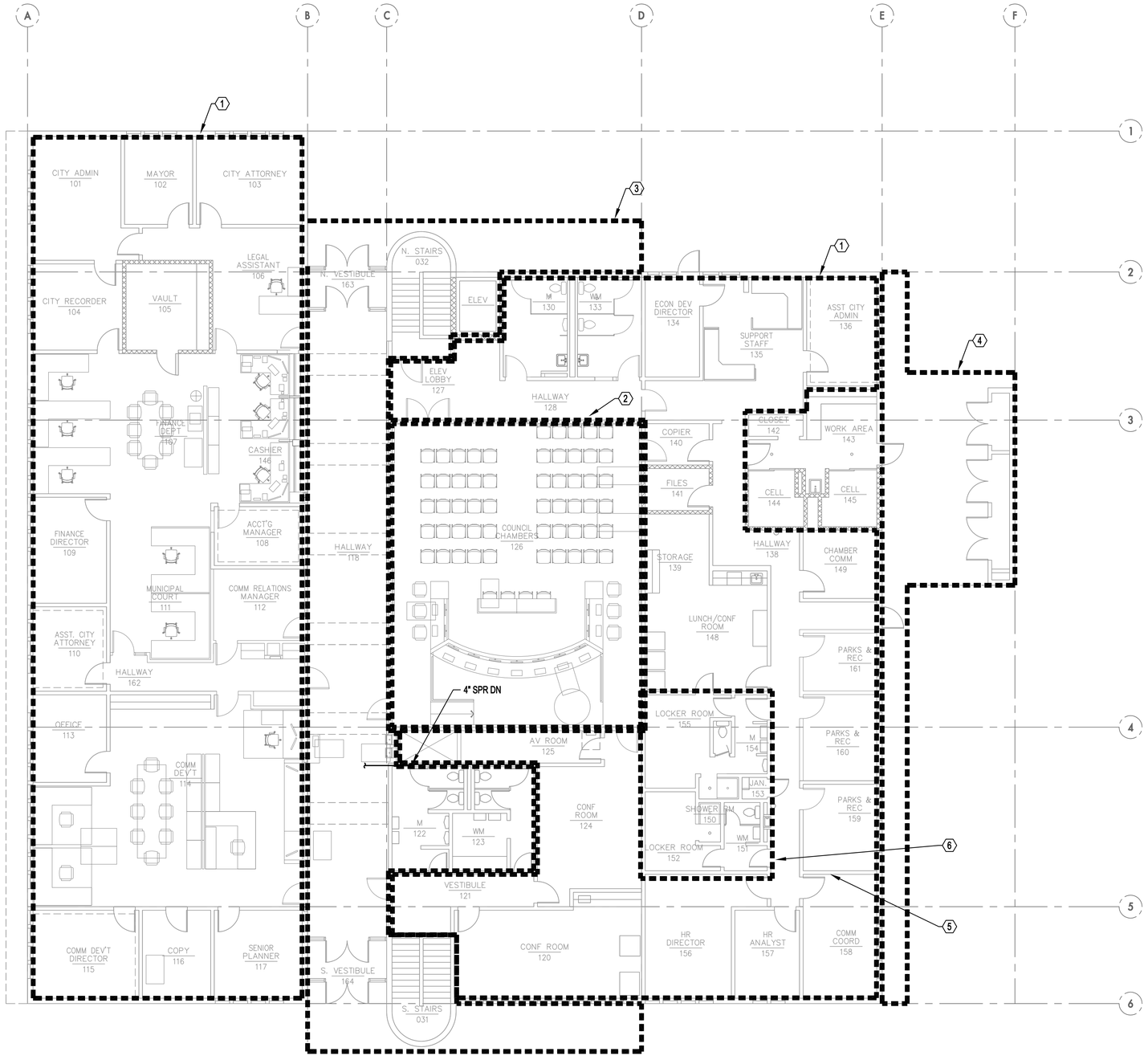

1 / FP201 FLOOR PLAN - GROUND LEVEL - FIRE PROTECTION

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

GENERAL NOTES:

A. VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. PRIOR TO PROCEEDING WITH WORK, NOTIFY THE ARCHITECT ABOUT ANY DISCREPANCIES BETWEEN DESIGN DOCUMENTS AND FIELD CONDITIONS.
B. PATCH AND REPAIR ALL OPENINGS MADE BY REMOVALS/DEMOLITION.
C. AFTER COMPLETING DEMO WORK, VERIFY THAT ALL SERVICES TO THE AREAS NOT INCLUDED IN THE DEMO WORK SCOPE AREA ARE FUNCTIONAL.

⬡ NOTE:

1. REVISE SPRINKLER HEAD LOCATIONS AND PIPING LAYOUT TO PROVIDE TOTAL COVERAGE PER NFPA 13. COORDINATE NEW SPRINKLER HEAD LOCATIONS WITH ARCHITECTURAL CEILING PLANS AND CEILING MOUNTED DEVICES AND DIFFUSERS. COORDINATED SPRINKLER TYPES (PENDANT VS UPRIGHT) IN AREAS WHERE CEILINGS HAVE BEEN REMOVED OR WHERE CEILINGS HAVE CHANGED. PROVIDE NEW SPRINKLER HEADS AS REQUIRED AND CONNECT TO EXISTING PLUMBING MAINS.
2. SEE ARCHITECTURAL RCP DRAWINGS FOR SPRINKLER HEAD LAYOUT. EXISTING SPRINKLER LINES TO BE RAISED TO ACCOMMODATE NEW CEILING HEIGHT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR NEW CEILING HEIGHT.
3. MODIFY EXISTING SPRINKLER LAYOUT IN ROOM, PROVIDE NEW SPRINKLERS AS REQUIRED TO PROVIDE COVERAGE IN ACCORDANCE WITH NFPA 13.
4. MODIFY EXISTING SPRINKLER LAYOUT UNDERNEATH COVERED AREAS, PROVIDE DRY SPRINKLER SYSTEM TO PROVIDE COVERAGE IN ACCORDANCE WITH NFPA 13. INCLUDE PROVISIONS FOR ELECTRIC AIR COMPRESSOR SERVING DRY SYSTEM, 1/3 HP, 120V/1PHASE.
5. FIELD VERIFY EXISTING SPRINKLER RISER LOCATION.
6. EXISTING FIRE PROTECTION SPRINKLER HEADS AND PIPING IN ROOM TO REMAIN.

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GROUND FLOOR PLAN - FIRE PROTECTION

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ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	KVA	KILOVOLT AMP
A	AMPERE (AMP)	KVAR	KILOVOLT AMPS REACTIVE
AL	ALUMINUM	LA	LIGHTNING ARRESTOR
ARCH	ARCHITECT / ARCHITECTURAL	LTG	LIGHTING
ATS	AUTOMATIC TRANSFER SWITCH	LV	LOW VOLTAGE
AWG	AMERICAN WIRE GAUGE	MATV	MASTER ANTENNA TELEVISION
CB	CIRCUIT BREAKER	MCA	MINIMUM CIRCUIT AMPS
C	CONDUIT	MCB	MAIN CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION	MCC	MOTOR CONTROL CENTER
CKT	CIRCUIT	MDP	MAIN DISTRIBUTION PANEL
CLG	CEILING	MECH	MECHANICAL
CT	CURRENT TRANSFORMER	MH	METAL HALIDE
CU	COPPER	MLO	MAIN LUGS ONLY
DN	DOWN	MV	MERCURY VAPOR
EMERG	EMERGENCY	MTS	MANUAL TRANSFER SWITCH
EMT	ELECTRIC METALLIC TUBING	NIC	NOT IN CONTRACT
EP	EXPLOSION PROOF	NL	NIGHT LIGHT CIRCUIT
EPO	EMERGENCY POWER OFF	PA	PUBLIC ADDRESS
EWC	ELECTRIC WATER COOLER	PE	PHOTO ELECTRIC CELL
FA	FIRE ALARM	PF	POWER FACTOR
FLA	FULL LOAD AMPS	PNL	PANELBOARD
FLUOR	FLUORESCENT	PVC	POLYVINYL CHLORIDE CONDUIT
FCIC	FURNISHED BY CONTRACTOR INSTALLED BY CONTRACTOR	PWR	POWER
		SDP	SUB-DISTRIBUTION PANEL
FOIC	FURNISHED BY OWNER INSTALLED BY CONTRACTOR	STR	STARTER
		SV	SOLENOID VALVE
FOIO	FURNISHED BY OWNER INSTALLED BY OWNER	SW	SWITCH
		TD	TIME DELAY
GFP	GROUND FAULT PROTECTION	TP	TAMPERPROOF
GFI	GROUND FAULT INTERRUPTER	TTB	TELEPHONE TERMINAL BOARD
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TTC	TELEPHONE TERMINAL CABINET
GRC	GALVANIZED RIGID CONDUIT	TV	TELEVISION
GRD	GROUND	TYP	TYPICAL
HP	HORSEPOWER	UG	UNDERGROUND
HPS	HIGH PRESSURE SODIUM	UPS	UNINTERRUPTABLE POWER SUPPLY
HV	HIGH VOLTAGE	V	VOLTAGE
HZ	HERTZ	VA	VOLT AMPERES
IG	ISOLATED GROUND	VP	VAPOR PROOF
INC	INCANDESCENT	W	WATTS
JB	JUNCTION BOX	WP	WEATHER PROOF
KW	KILOWATT	XFMR	TRANSFORMER
KWH	KILOWATT HOUR	XFSW	TRANSFER SWITCH
KV	KILOVOLT		

LIGHTING

- CEILING LUMINAIRE: SURFACE, RECESSED
- CEILING LUMINAIRE: PENDANT MOUNTED
- CEILING LUMINAIRE: PENDANT LINEAR
- WALL LUMINAIRE: SURFACE, RECESSED
- WALL WASHER: SURFACE, RECESSED
- TRACK WITH HEADS LOCATED
- FLUORESCENT LUMINAIRE: SURFACE, RECESSED
- FLUORESCENT LUMINAIRE: WALL MOUNTED
- FLUORESCENT LUMINAIRE: BARE LAMP
- POLE LIGHT: LUMINAIRES AS SHOWN
- DESIGNATES LIGHT ON EMERGENCY CIRCUIT 'EM' DENOTED INTEGRAL BATTERY PACK TO BE INCLUDED IN LUMINAIRE
- EXIT LIGHT: CEILING, WALL (ARROWS AS SHOWN)
- BOLLARD
- EMERGENCY BATTERY LIGHT: HEADS AS SHOWN
- LIGHTING CONTROL STATION
- WALL SWITCH: 1 POLE, 2 POLE
- WALL SWITCH: 3 WAY, 4 WAY
- WALL SWITCH: KEY LOCK, MOMENTARY
- WALL SWITCH: LOW VOLTAGE, PILOT
- WALL SWITCH: TIMER, MANUAL DIMMER
- WALL SWITCH: COMBINATION OCCUPANCY SENSOR / SWITCH
- DESIGNATES LUMINAIRE TYPE (SEE LUMINAIRE SCHEDULE)
- DESIGNATES NIGHT LIGHT CIRCUIT
- PHOTOELECTRIC CELL: WALL MOUNTED, CEILING MOUNTED
- OCCUPANCY SENSOR: CEILING OR WALL MOUNTED "X" DESIGNATES DEVICE TYPE: U: ULTRASONIC R: INFRARED UR: DUAL TECHNOLOGY, ULTRASONIC/INFRARED

DESIGNATION SYMBOLS

- EQUIPMENT DESIGNATOR SEE SCHEDULE.
- EXISTING TO REMAIN, EXISTING TO BE REMOVED
- EXISTING TO BE RELOCATED, FUTURE
- NEW, CONNECT TO
- NOTE

FIRE ALARM

- SPRINKLER SYSTEM SWITCH: FLOW, TAMPER
- MANUAL FIRE ALARM STATION
- DETECTOR: IONIZATION, HEAT, PHOTOELECTRIC
- DETECTOR: BEAM
- DUCT DETECTOR, TYPE AS NOTED
- FIREMANS PHONE JACK
- MAGNETIC DOOR HOLDER, CLOSER

WALL	CEILING	NOTIFICATION DEVICES
F	F	FIRE ALARM: VISUAL
F F	F F	FIRE ALARM: HORN; HORN W/VISUAL
S S	S S	FIRE ALARM: SPEAKER; SPEAKER W/VISUAL
F F	F F	FIRE ALARM: BELL; BELL W/VISUAL
C C	C C	FIRE ALARM: CHIME; CHIME W/VISUAL

NOTE

THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

POWER

- WALL RECEPTACLE: SINGLE, DUPLEX
- WALL RECEPTACLE: EMERGENCY, 4-PLEX
- WALL RECEPTACLE: ISOLATED GROUND
- CEILING RECEPTACLE: DUPLEX
- FIRE RATED FLOOR POKE-THRU
- CONNECTION TO EQUIPMENT PROVIDED BY OTHERS
- DENOTES RECEPTACLE ABOVE COUNTER
- SPECIAL PURPOSE OUTLET AS NOTED, EMERGENCY
- CLOCK HANGER RECEPTACLE
- OUTLET TYPE: DATA, TELEPHONE
- FB1 — FLUSH FLOORBOX RECEPTACLE. REFER TO SCHEDULE FOR QUANTITY AND TYPES OF DEVICES.
- FLUSH IN-FLOOR OUTLET: DUPLEX, COMBINATION
- PEDESTAL OUTLET: POWER, SIGNAL, COMBINATION
- SURFACE OUTLET STRIP: DIMENSION AS SHOWN
- TELEPOWER POLE, POWER, COMBINATION
- JUNCTION BOX
- 60A 45F — DISCONNECT SWITCH: FUSED, NON-FUSED
- MOTOR STARTER: MANUAL, MAGNETIC, COMBINATION
- MOTOR CONNECTION
- CONTACTOR, RELAY, SOLENOID
- PUSH BUTTON STATION
- WIRING CONCEALED IN CEILING OR WALL
- WIRING CONCEALED IN FLOOR OR UNDERGROUND
- INDICATES INSULATED GREEN GROUND WIRE
- HOME RUN DESTINATION SHOWN
- CONDUIT ELL: UP, DN.

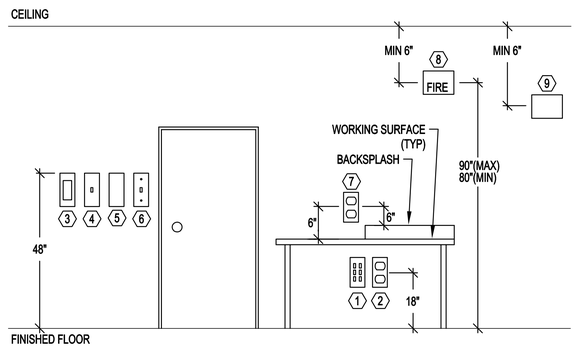
EQUIPMENT

- ELECTRICAL EQUIPMENT
- PANELBOARD: SURFACE, RECESSED
- CABINET: SURFACE, RECESSED
- TRANSFORMER
- GROUND ROD, IN TEST WELL
- GROUND PAD
- VOLTMETER, AMMETER
- SELECTOR SWITCH: VOLTMETER, AMMETER
- METER: KILOWATT HOUR, POWER FACTOR
- POTENTIAL TRANSFORMER
- CURRENT TRANSFORMER
- CABLE TRAY: CENTER SUPPORT, OUTER SUPPORTS

ONE-LINE

- CIRCUIT BREAKER
- SWITCH, FUSED SWITCH
- BUS
- AUTOMATIC SWITCH
- METER
- PANEL (XXX / XX)
- FEEDER CALLOUT (X)
- FAULT CURRENT CALLOUT (XXX)
- GENERATOR (G)
- TRANSFORMER (T)

DEVICE MOUNTING HEIGHTS



GENERAL NOTES:

1. LOCATE ALL FIRE ALARM DEVICES PER CODE.
2. LOCATE ALL ACCESSIBLE SWITCHES PER ADA GUIDELINES.
3. FIELD COORDINATE ALL ABOVE COUNTER DEVICES WITH MILLWORK CONTRACTOR.
4. IF APPLICABLE, TELCOM CONSULTANTS DRAWINGS TAKE PRECEDENCE OVER THIS DETAIL FOR TELCOM DEVICES.

NOTES:

1. TELECOM OUTLET
2. RECEPTACLE
3. FIRE ALARM PULL STATION
4. LIGHT SWITCH
5. CARD READER
6. WALL PHONE
7. ABOVE COUNTER DEVICE MAINTAIN A CONSISTANT HEIGHT THROUGHOUT SPACE
8. FIRE ALARM STROBE
9. OCCUPANCY SENSOR

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12-13-18
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SYMBOLS, LEGENDS & ABBREVIATIONS - ELECTRICAL

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E001

LUMINAIRE SCHEDULE

FIXTURE TYPE	PRODUCT DESCRIPTION	BASIS OF DESIGN MANUFACTURER	SIZE	INPUT WATTS	LAMP SOURCE (Type, CCT, Delivered Lumens)	POWER SUPPLY (Integral/Remote) (Electronic/Magn.) (Dimming Type)	INPUT VOLTAGE	FINISH	MOUNTING	NOTES
L1	2X4 RECESSED	FINELITE HPR	2' X 4'	27	STANDARD LIGHT OUTPUT LED 3892 LUMENS 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	RECESSED	FLAT DOOR STYLE
L2	1X4 RECESSED TROFFER	LITHONIA LIGHTING GTL	1' X 4'	19	LED 2426 LUMENS 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	RECESSED	
L3	SQUARE RECESSED DOWNLIGHT	GOTHAM EVO SQUARE	4"	23.5	LED 2000 LUMENS 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	RECESSED	APERTURE/TRIM COLOR: WHITE
L4	LINEAR LED	FINELITE HP-2	4'	73.5	LED 6988 LUMENS 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	PENDANT	DOWNLIGHT: REGRESSED DIFFUSER
L5	WALL SCONCE	EATON 605 SERIES	25"	20	LED 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	PER ARCHITECT	SURFACE MOUNT	TO BE MOUNTED VERTICALLY
L6	LED WALL VANITY	LITHONIA CONTEMPORARY CYLINDER OR SIMILAR METALUX, DAYBRITE, HE WILLIAMS APPROVED EQUAL	2' OR 4' LENGTH AS INDICATED ON PLANS	9 W/LF	749 lm/LF 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	MVOLT	BRUSHED NICKEL	SURFACE MOUNT	
L7	SURFACE SPOTLIGHT LED	CLARTE LIGHTING SDT-837-PAR20	6"	28	LED 2000 LM 4000K	INTEGRAL ELECTRONIC ON/OFF	120	WHITE	PENDANT	FLAT CANOPY PLATE MOUNTING
L8	LINEAR LED STRIP LIGHT	LITHONIA ZL2N SERIES OR SIMILAR METALUX, DAYBRITE, HE WILLIAMS APPROVED EQUAL	48" L X 3 3/8" W X 3 1/4" D	42	LED 3000 LM 4000K	INTEGRAL ELECTRONIC	120	STANDARD	PENDANT	
L9	COVE LIGHT	ELLIPTIPAR STYLE S314	4'	27.2	LED 3450 LM 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	SURFACE COVE	REMOTE DRIVERS TOBE LOCATED IN AN ACCESSIBLE AREA.
L10	SQUARE LENSED LED WALLWASH DOWNLIGHT	GOTHAM EVO SQLW	4"	23.5	LED 2000 LM 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	RECESSED	APERTURE/TRIM COLOR: WHITE
L11	WALL SLOT WALL WASHER	FINELITE HP-WS	48" X 6"W X 6"D	37	LED 3000 LM 4000K	INTEGRAL ELECTRONIC 0-10V DIMMING	120	STANDARD	SLOT WALL WASHER	4 FOOT LENGTHS
X1	EXIT SIGNS	LITHONIA EDG/ RED LETTERS/CLEAR FACE	13" X 5" x 12"	5	LED	NA	120	STANDARD	RECESSED	RED LETTERS ON CLEAR, FOR NUMBER OF FACES REFER TO PLANS. INCLUDE BATTERY BACKUP

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SCHEDULES - ELECTRICAL

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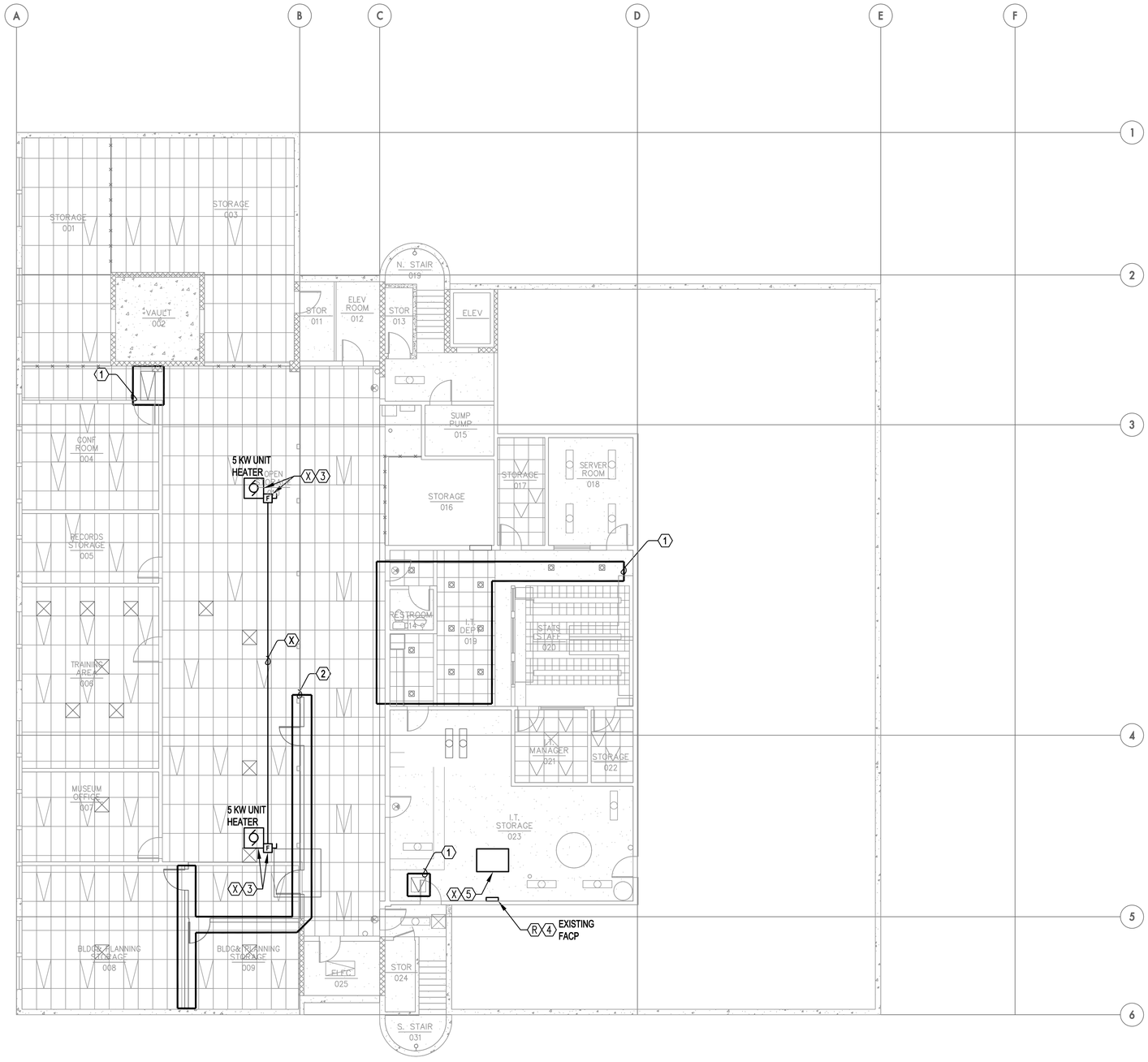

1 / E100 DEMO FLOOR PLAN - BASEMENT - ELECTRICAL

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

GENERAL NOTES:

A. SCHEDULE DEMOLITION IN ADVANCE. SCHEDULE WORK TO AVOID DISRUPTION OF NORMAL OPERATIONS.

B. EXISTING ELECTRICAL DEVICES AND SERVICES NOT SPECIFICALLY INDICATED TO BE REMOVED OR ALTERED SHALL REMAIN AS THEY PRESENTLY EXIST.

C. DEMOLITION OF ITEMS WITH CIRCUITS THAT ARE SHARED WITH ITEMS TO REMAIN, THE DEMO CIRCUIT SHALL BE REMOVED TO THE NEAREST JUNCTION BOX, PROVIDE COMPLETE REPAIR OF THE CIRCUITS REMAINING TO SERVE EXISTING ITEMS.

D. ALL FINISHES, WALLS AND STRUCTURES IMPACTED BY THE DEMOLITION, BUT ARE TO REMAIN, SHALL BE RESTORED TO MATCH THE EXISTING CONDITIONS, INCLUDE ANY PATCHING AND PAINTING.

E. WHERE EXISTING SYSTEMS THAT ARE TO REMAIN ARE IMPACTED BY THE DEMOLITION, PROVIDE A MINIMUM OF 48 HOURS NOTIFICATION OF THE IMPACTS AND DOWNTIME TO THE OWNER/ARCHITECT.

F. ALL EXISTING SYSTEMS THAT ARE TO REMAIN IN SERVICE PASSING THROUGH THE DEMOLITION AREA, SHALL BE PROTECTED FROM DAMAGE DURING THE DEMOLITION WORK.

G. REFER TO THE DEMOLITION ITEMS ON THE ARCHITECTURAL DRAWINGS FOR DEMOLITION EQUIPMENT AND SERVICES. COORDINATE WITH OTHER TRADES FOR THE EQUIPMENT REMOVAL.

H. PROVIDE REMOVAL AND REPLACEMENT OF CEILING ASSEMBLIES, CEILING TILES, LIGHTING FIXTURES. WHERE ACCESS IS REQUIRE TO REMOVE DEMOLITION ITEMS.

I. PROVIDE NOTIFICATION AND COORDINATION WITH THE OWNER/ARCHITECT WHERE WORK IN PUBLIC AREAS IS REQUIRED.

J. PROVIDE PATCHING AND PAINTING OF WALL SURFACES WHERE DEVICES ARE REMOVED AND THE WALL IS TO REMAIN.

NOTES:

1. REMOVE ALL LIGHTING, WITHIN DEMOLITION AREA. EXISTING CIRCUITING TO BE REUSED FOR NEW LIGHTING.

2. SWITCHES, RECEPTACLES, DATA OUTLETS, SPEAKERS AND FIRE ALARM DEVICES WITHIN AREA, PROVIDE COMPLETE DEMO INCLUDING CONDUITS AND CONDUCTORS BACK TO NEAREST JUNCTION BOX IN CEILING.

3. DEMO 5KW/208V/3PHASE UNIT HEATERS ALONG WITH ASSOCIATED DISCONNECTS/CABLES/CONDUITS BACK TO MDP. LABEL FUSED DISCONNECT AT MDP AS SPARE.

4. EXISTING FACP TO BE RELOCATED TO AN ACCESSIBLE LOCATION AWAY FROM SPRINKLER RISER.

5. IT SUITE AHU UNIT TO BE REMOVED. EXISTING CIRCUITING TO BE REUSED FOR NEW UNIT.

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BASEMENT DEMO PLAN - ELECTRICAL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
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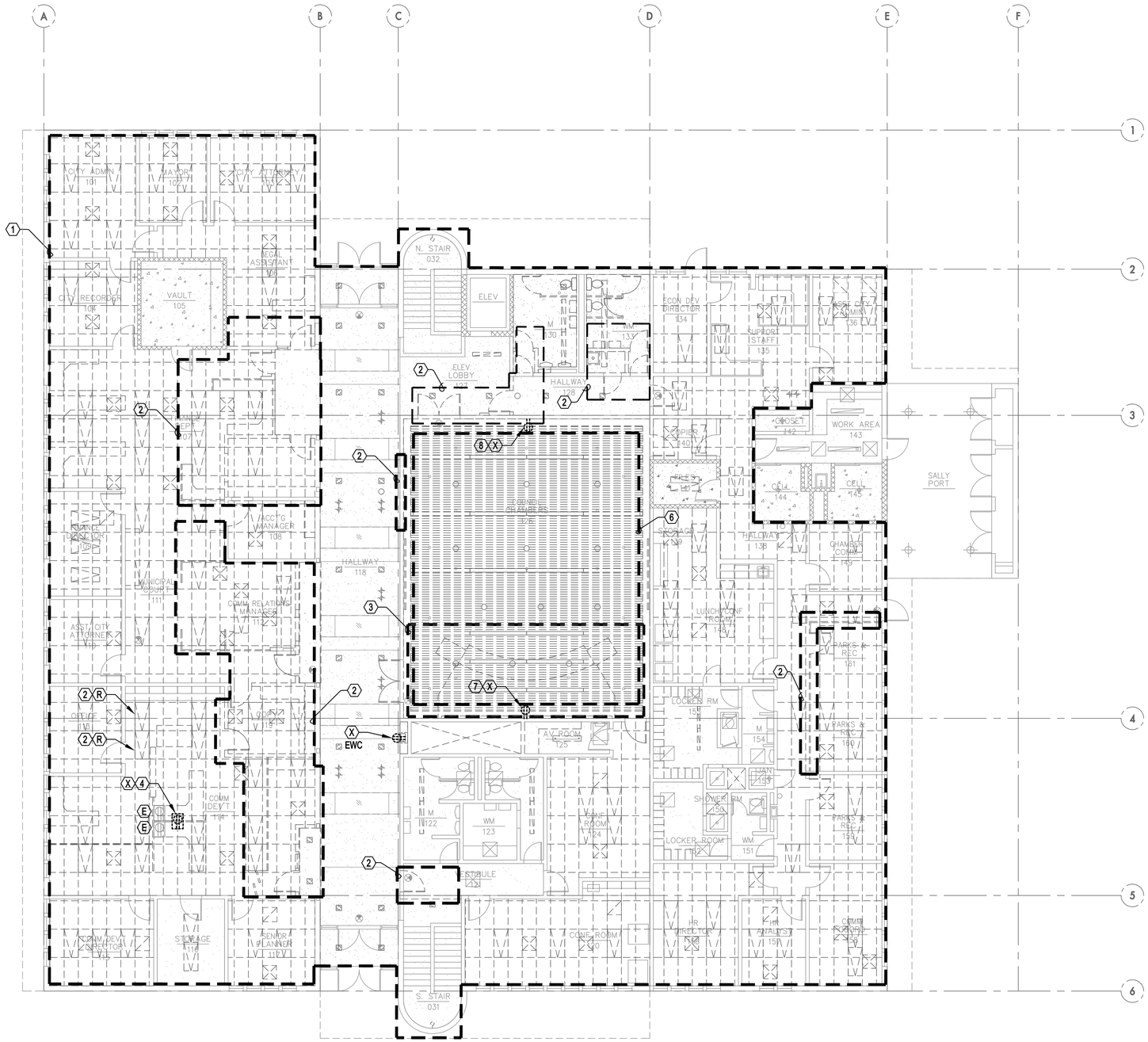

1 / E-101 DEMO FLOOR PLAN - GROUND LEVEL - ELECTRICAL

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

GENERAL NOTES:

A. SCHEDULE DEMOLITION IN ADVANCE. SCHEDULE WORK TO AVOID DISRUPTION OF NORMAL OPERATIONS.

B. EXISTING ELECTRICAL DEVICES AND SERVICES NOT SPECIFICALLY INDICATED TO BE REMOVED OR ALTERED SHALL REMAIN AS THEY PRESENTLY EXIST.

C. DEMOLITION OF ITEMS WITH CIRCUITS THAT ARE SHARED WITH ITEMS TO REMAIN, THE DEMO CIRCUIT SHALL BE REMOVED TO THE NEAREST JUNCTION BOX, PROVIDE COMPLETE REPAIR OF THE CIRCUITS REMAINING TO SERVE EXISTING ITEMS.

D. ALL FINISHES, WALLS AND STRUCTURES IMPACTED BY THE DEMOLITION, BUT ARE TO REMAIN, SHALL BE RESTORED TO MATCH THE EXISTING CONDITIONS, INCLUDE ANY PATCHING AND PAINTING.

E. WHERE EXISTING SYSTEMS THAT ARE TO REMAIN ARE IMPACTED BY THE DEMOLITION, PROVIDE A MINIMUM OF 48 HOURS NOTIFICATION OF THE IMPACTS AND DOWNTIME TO THE OWNER/ARCHITECT.

F. ALL EXISTING SYSTEMS THAT ARE TO REMAIN IN SERVICE PASSING THROUGH THE DEMOLITION AREA, SHALL BE PROTECTED FROM DAMAGE DURING THE DEMOLITION WORK.

G. REFER TO THE DEMOLITION ITEMS ON THE ARCHITECTURAL DRAWINGS FOR DEMOLITION EQUIPMENT AND SERVICES. COORDINATE WITH OTHER TRADES FOR THE EQUIPMENT REMOVAL.

H. PROVIDE REMOVAL AND REPLACEMENT OF CEILING ASSEMBLIES, CEILING TILES, LIGHTING FIXTURES. WHERE ACCESS IS REQUIRE TO REMOVE DEMOLITION ITEMS.

I. PROVIDE NOTIFICATION AND COORDINATION WITH THE OWNER/ARCHITECT WHERE WORK IN PUBLIC AREAS IS REQUIRED.

J. PROVIDE PATCHING AND PAINTING OF WALL SURFACES WHERE DEVICES ARE REMOVED AND THE WALL IS TO REMAIN.

NOTES:

1. REMOVE ALL LIGHTING, WITHIN DEMOLITION AREA. EXISTING CIRCUITING TO BE REUSED FOR NEW LIGHTING.

2. SWITCHES, RECEPTACLES, DATA OUTLETS, SPEAKERS AND FIRE ALARM DEVICES WITHIN AREA, PROVIDE COMPLETE DEMO INCLUDING CONDUITS AND CONDUCTORS BACK TO NEAREST JUNCTION BOX IN CEILING.

3. DEMO BACK TO NEAREST FLOOR/WALL JUNCTION BOX AND MAINTAIN CIRCUITRY FOR NEW CASEWORK.

4. DEMO EXISTING PROJECTING FLOORBOX AND MAINTAIN CONTINUITY OF CIRCUITING. BLANK COVER PLATE TO BE PROVIDED FOR FUTURE ACCESSIBILITY. ALL RECESSED FLOOR BOXES IN THE AREA TO REMAIN.

5. (2) EXISTING 2X4 LAY-IN TO BE REMOVED AND RELOCATED IN BASEMENT LEVEL. SEE E200 FOR FURTHER INFORMATION.

6. REMOVE & REUSE EXISTING WALL MOUNTED DEVICES UNLESS OTHERWISE NOTED. COORDINATE WITH ARCH SEISMIC WORK (SEE SHEET A101). PROVIDE BOX EXTENSION AS REQUIRED.

7. RECEPTACLE AND JUNCTION BOX TO BE REMOVED. NEW RECEPTACLE TO BE ADDED IN AV ROOM TO ALLOW FOR CIRCUIT TO BE INTERCEPTED AND MAINTAIN CIRCUIT INTEGRITY TO DOWNSTREAM LOADS.

8. DEMO BACK TO ADJACENT RECEPTACLE. CIRCUITING TO BE EXTENDED TO NEW RECEPTACLE LOCATION IN COUNCIL CHAMBERS. SEE SHEET E301 FOR NEW WORK.

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GROUND FLOOR DEMO PLAN - ELECTRICAL

Scale 1/8" = 1'-0"
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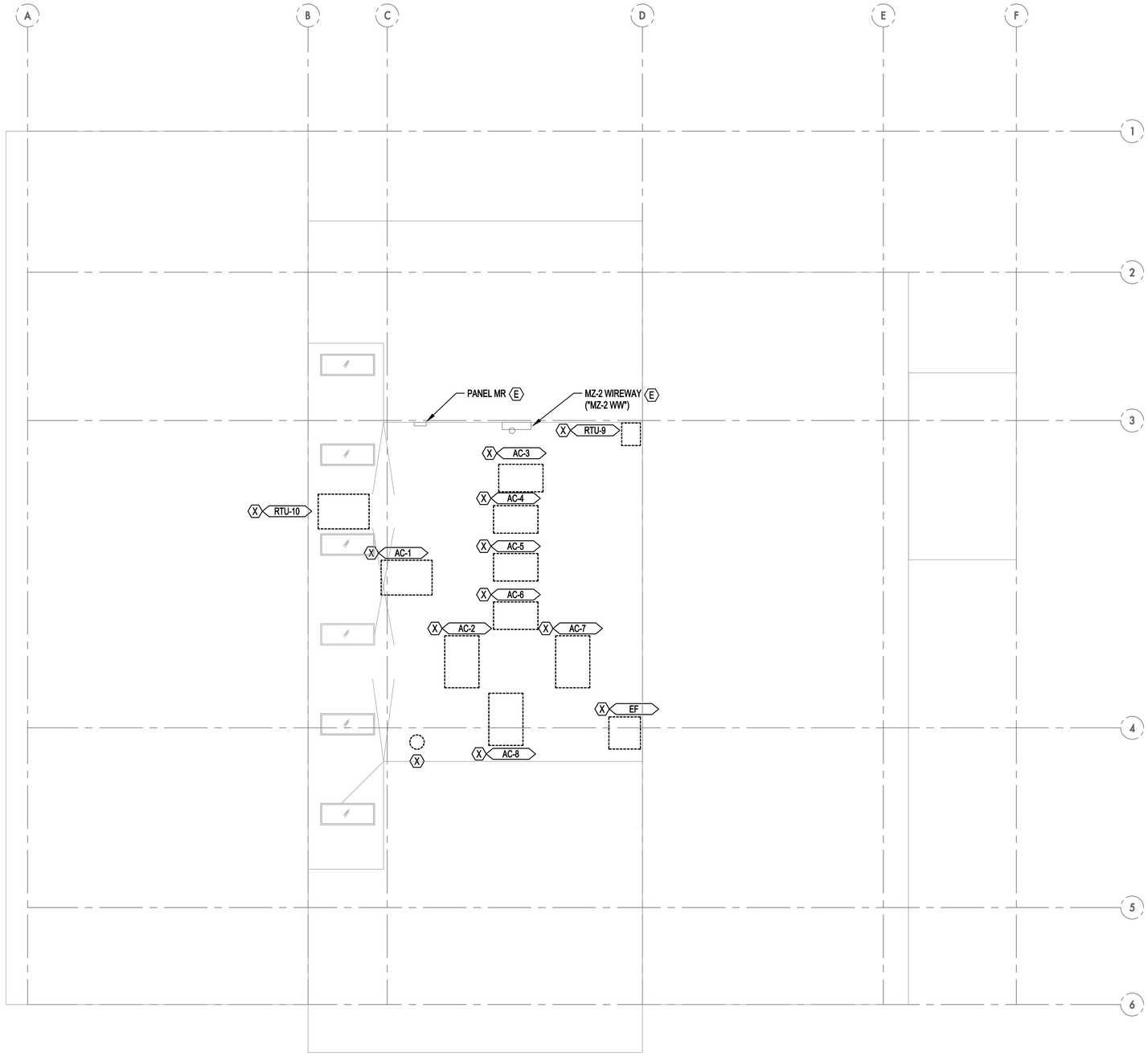

1 / E102 DEMOLITION PLAN - ROOF - ELECTRICAL

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

GENERAL NOTES:

A. ALL EXISTING ROOFTOP UNITS, ELECTRICAL DISCONNECTS, CABLE, CONDUIT, SUPPORTS AND OTHER ELECTRICAL APPURTENANCES ARE TO BE DEMOLISHED BACK TO PANEL MR & WIREWAY.

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ROOF DEMO PLAN - ELECTRICAL

Scale	1/8" = 1'-0"
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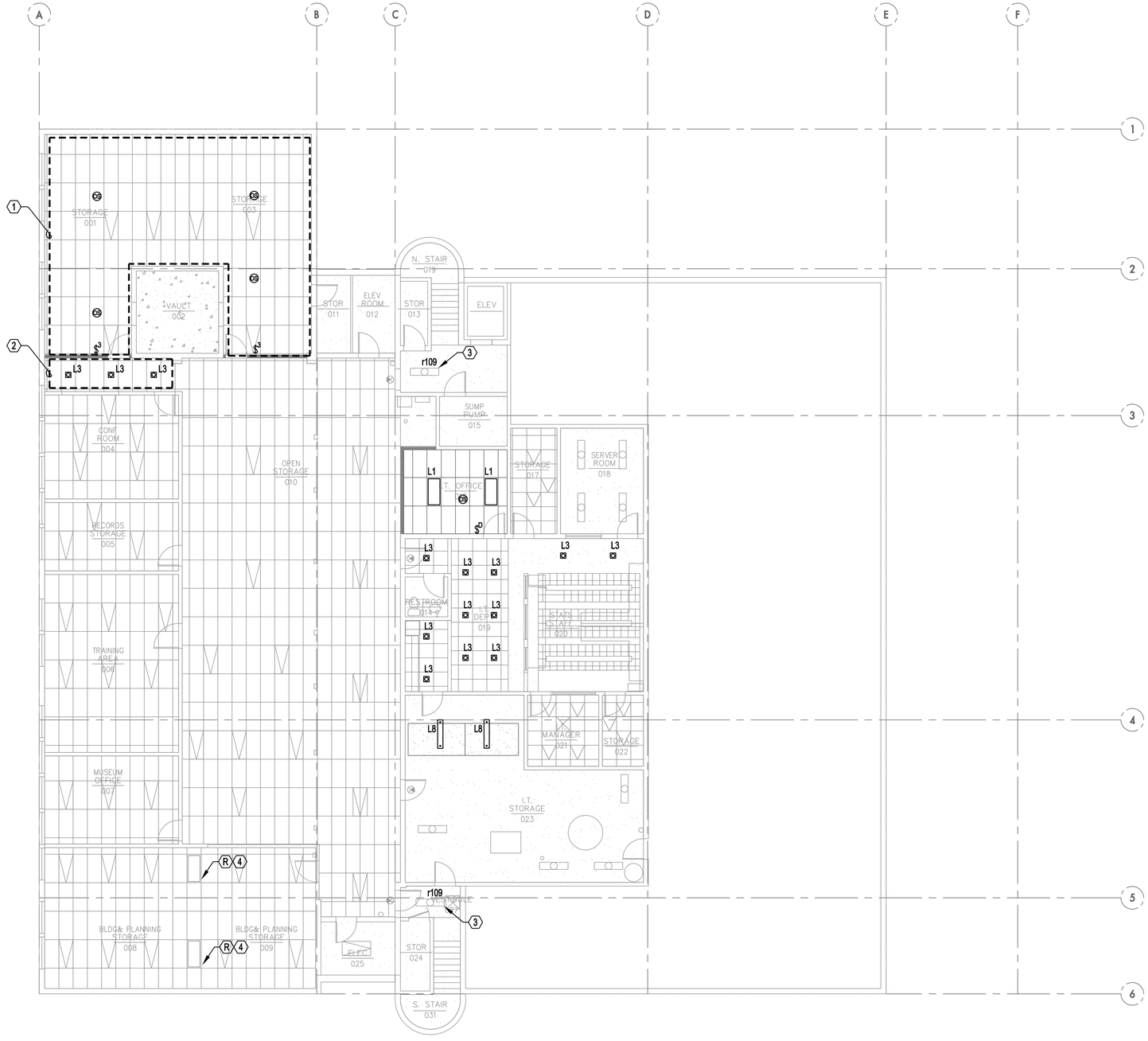

1 E200 REFLECTED CEILING PLAN - BASEMENT - LIGHTING

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

GENERAL NOTES:

A. REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS FOR ADDITIONAL LUMINAIRE LOCATION LAYOUTS.

B. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE FOR EXACT LOCATION AND MOUNTING HEIGHTS OF LUMINAIRES AND SWITCHES.

C. PROVIDE FIRESTOPPING AT ALL PENETRATIONS THROUGH RATED STAIR ENCLOSURES, RATED EGRESS CORRIDORS, RATED SHAFTS, FLOOR AND CEILING ASSEMBLIES.

D. REFER TO DRAWING E-002 FOR LUMINAIRE SCHEDULE.

NOTES:

1. EXISTING LIGHTING IN STORAGE 001 & 003 TO BE TIED INTO NEW 3-WAY SWITCHES AND OCCUPANCY SENSOR TIMEOUTS WITHIN ROOM.

2. NEW 'L3' DOWNLIGHTS TO BE TIED INTO SWITCH CONTROLS FOR OPEN STORAGE 010.

3. EXISTING STAIR LIGHTING TO BE PART OF NEW.

4. SALVAGE (2) 2x4 LAY-IN FLUORESCENT FROM RENOVATION ON MAIN FLOOR AND PLACE IN STORAGE.

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BASEMENT REFLECTED CEILING PLAN - LIGHTING

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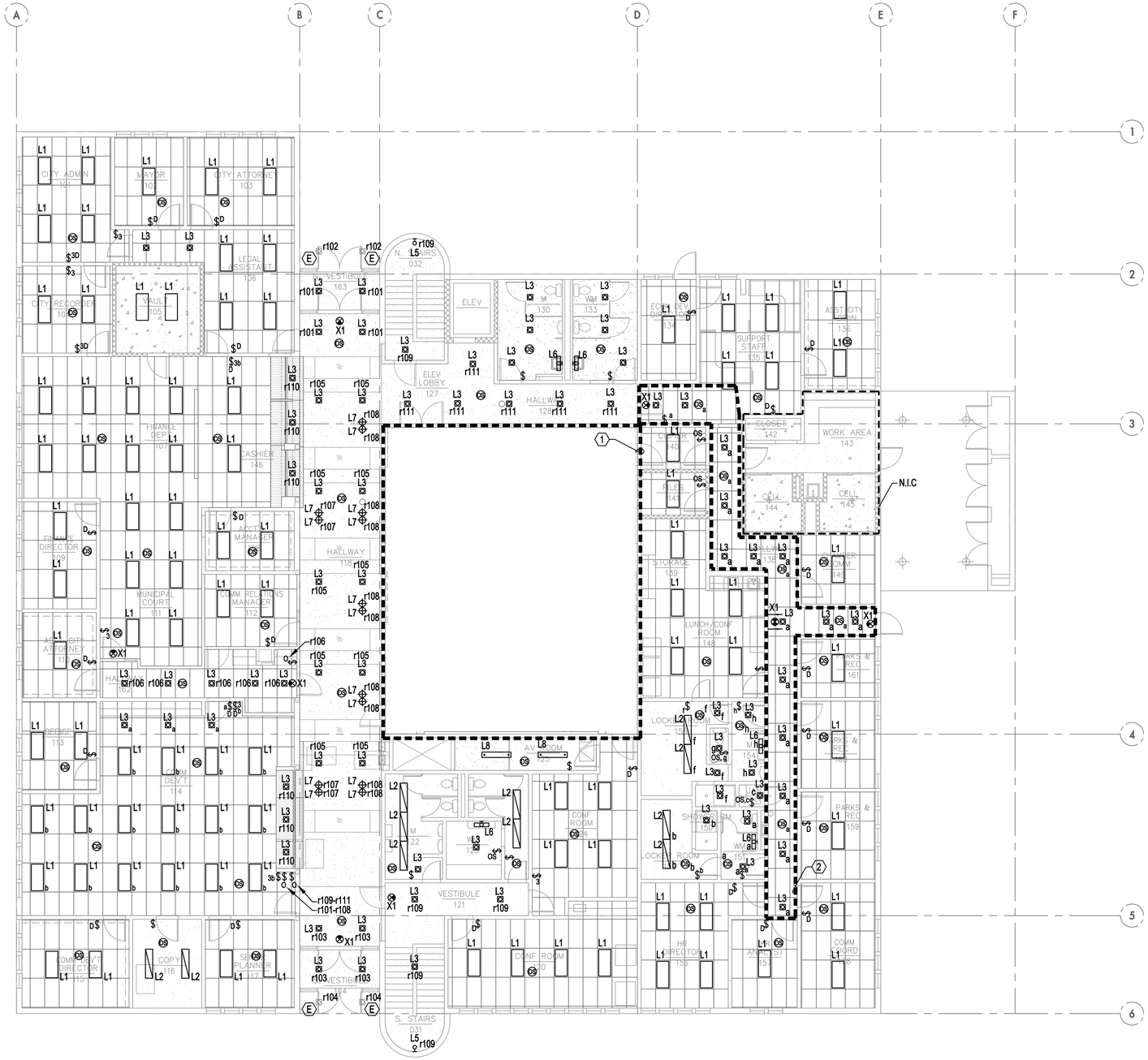

1 NOTES:

1. REFER TO SHEET E601 FOR COUNCIL CHAMBERS LIGHTING SYSTEM.

2. LIGHTS IN DASHED REGION TO BE FED BY INVERTER. REFER TO PANEL SCHEDULES FOR CIRCUITING INFORMATION.

GENERAL NOTES:

A. REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS FOR ADDITIONAL LUMINAIRE LOCATION LAYOUTS.

B. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE FOR EXACT LOCATION AND MOUNTING HEIGHTS OF LUMINAIRES AND SWITCHES.

C. PROVIDE FIRESTOPPING AT ALL PENETRATIONS THROUGH RATED STAIR ENCLOSURES, RATED EGRESS CORRIDORS, RATED SHAFTS, FLOOR AND CEILING ASSEMBLIES.

D. REFER TO DRAWING E-002 FOR LUMINAIRE SCHEDULE.

E. SWITCH LOCATIONS ARE SHOWN FOR INTENT. LOCATIONS MAY VARY ON THE FIELD. EXISTING SWITCH LOCATIONS ARE TO BE REUSED WHEN INSTALLING NEW SWITCHED AND UTILIZING EXISTING CIRCUITING.

F. REFER TO SHEET E601 FOR LIGHTING RELAY CONTROL INFORMATION.

1 / E201 REFLECTED CEILING PLAN - GROUND LEVEL - LIGHTING

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

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GROUND FLOOR REFLECTED CEILING PLAN - LIGHTING

Scale	1/8" = 1'-0"
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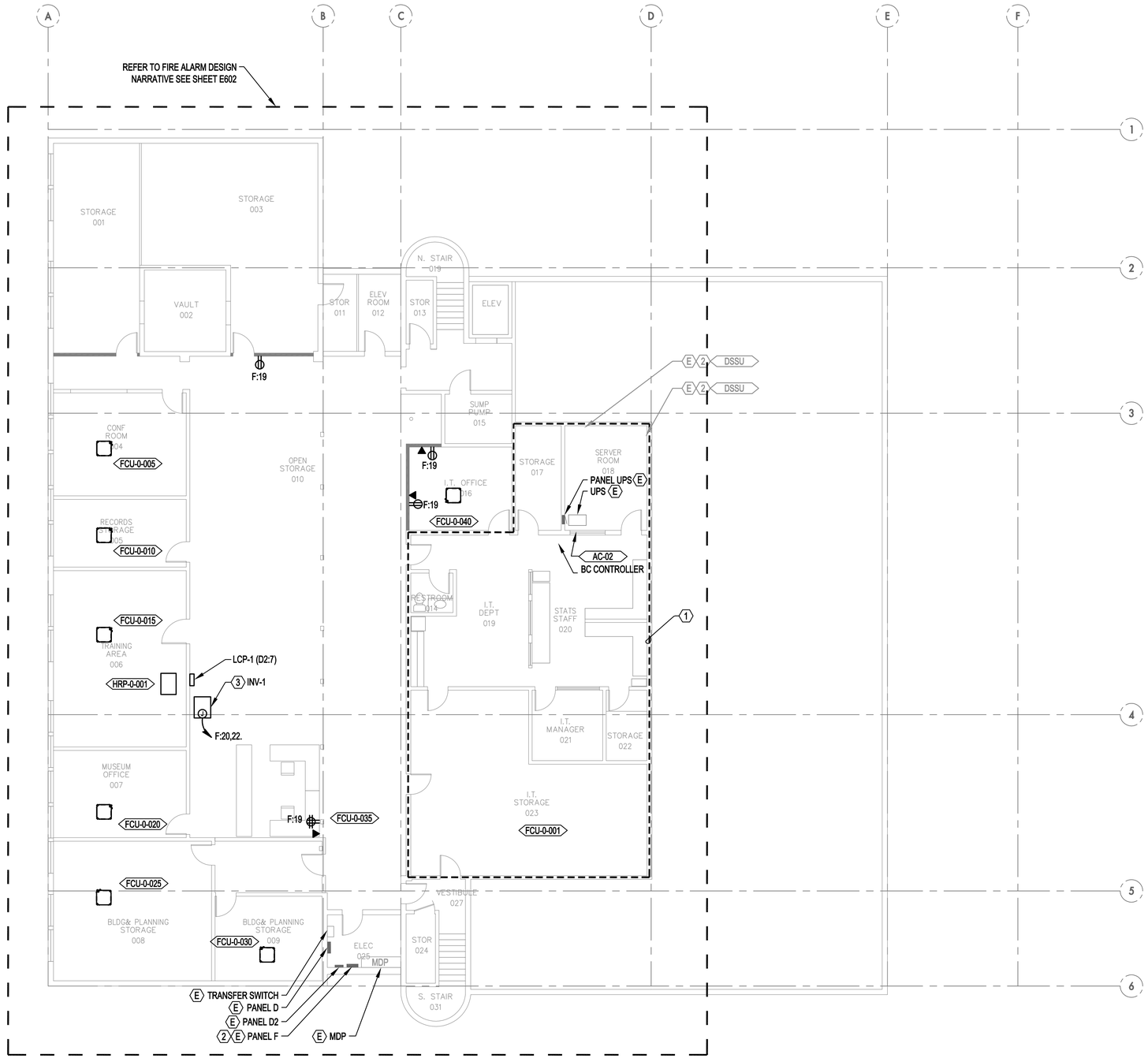
Sheet No.	E201



1 E-300 FLOOR PLAN - BASEMENT - POWER & SIGNAL

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

N

GENERAL NOTES:

A. REFER TO THE ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION AND MOUNTING HEIGHTS OF ALL DEVICES. WHERE NO ELEVATION EXISTS, REFER TO TYPICAL MOUNTING HEIGHTS ON THE E-001 LEGEND DRAWING.

B. REFER TO ARCHITECTURAL FLOOR PLANS FOR EXACT LOCATION OF FLOOR DEVICES.

C. PROVIDE FIRESTOPPING AT ALL PENETRATIONS THROUGH RATED STAIR ENCLOSURES, RATED EGRESS CORRIDORS, RATED SHAFTS, FLOOR AND CEILING ASSEMBLIES.

D. PROVIDE FLEXIBLE CONNECTIONS FOR ALL CONDUITS CROSSING EXPANSION JOINTS.

E. COORDINATE EQUIPMENT CONNECTIONS WITH MECHANICAL CONTRACTOR. REFER TO DRAWING E802 FOR MECHANICAL EQUIPMENT CONNECTION SCHEDULE.

F. PROVIDE #10 CONDUCTORS FOR RECEPTACLES CIRCUITS EXCEEDING TOTAL LENGTH OF 100 FEET BETWEEN DEVICE AND PANEL.

G. REFER TO THE MECHANICAL AND PLUMBING PLANS FOR EXACT EQUIPMENT LOCATIONS.

H. ALL PENETRATIONS AND ROUTING PATHS OF EXPOSED CONDUIT SHALL BE COORDINATED AND REVIEWED BY THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION.

I. PROVIDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR FOR EACH BRANCH CIRCUIT, DO NOT SHARE NEUTRAL CONDUCTORS.

J. UTILIZE NO MORE THAN SIX CURRENT CARRYING CONDUCTORS PER BRANCH CIRCUIT HOMERUN.

K. CONTRACTOR TO INSTALL BOXES, RACEWAYS WITH PULL STRINGS FROM DEVICE LOCATION TO SERVER ROOM FOR ALL DATA DROPS. COORDINATE WITH WOODBURN IT PERSONNEL FOR STANDARD MEANS AND METHODS FOR IT INSTALLATION. CABLES, DEVICES AND TERMINATIONS BY OTHERS.

L. ALL ELECTRICAL PANELS/DISTRIBUTION BOARDS/UPS SYSTEMS ARE EXISTING UNLESS OTHERWISE NOTED.

M. PANEL SCHEDULES TO BE UPDATED BASED ON CIRCUIT UPDATES.

NOTES:

1. AREA WITHIN DASHED REGION SHALL MAINTAIN OPERATION DURING CONSTRUCTION. ANY POWER OUTAGES IN THIS AREA ARE TO BE SCHEDULED WITH OWNER/OWNER REPRESENTATIVES.

2. PROVIDE 5-20A/1P BREAKER IN PANEL F FOR FUTURE EXPANSION.

3. PROVIDE 30A/2P BREAKER IN PANEL F FOR LIGHTING INVERTER.

Issue	Revision	Date
100% CD		12/14/18

BASEMENT FLOOR PLAN - POWER & SIGNAL

Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
Sheet No.	E300

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11612
OREGON
JULY 16, 1982
STEPHEN J. TURINA
12-13-18
EXPIRES 6-30-20

WOODBURN CITY HALL REMODEL AND HVAC UPGRADE

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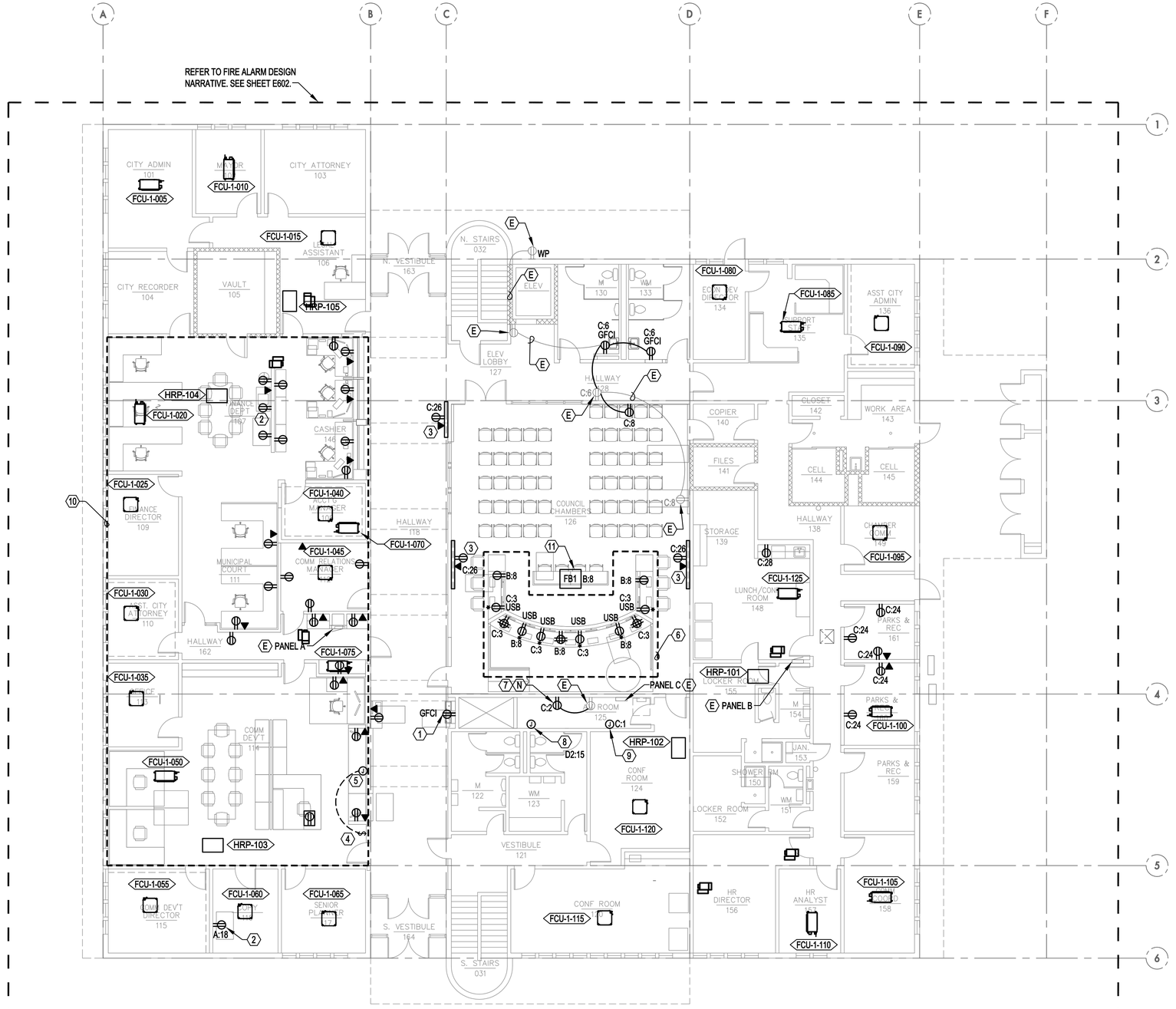

1 E301 FLOOR PLAN - GROUND LEVEL - POWER & SIGNAL

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

GENERAL NOTES:

A. REFER TO THE ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION AND MOUNTING HEIGHTS OF ALL DEVICES. WHERE NO ELEVATION EXISTS, REFER TO TYPICAL MOUNTING HEIGHTS ON THE E-XXX LEGEND DRAWING.

B. REFER TO ARCHITECTURAL FLOOR PLANS FOR EXACT LOCATION OF FLOOR DEVICES.

C. PROVIDE FIRESTOPPING AT ALL PENETRATIONS THROUGH RATED STAIR ENCLOSURES, RATED EGRESS CORRIDORS, RATED SHAFTS, FLOOR AND CEILING ASSEMBLIES.

D. PROVIDE FLEXIBLE CONNECTIONS FOR ALL CONDUITS CROSSING EXPANSION JOINTS.

E. COORDINATE EQUIPMENT CONNECTIONS WITH MECHANICAL CONTRACTOR. REFER TO DRAWING E802 FOR MECHANICAL EQUIPMENT CONNECTION SCHEDULE.

F. PROVIDE #10 CONDUCTORS FOR RECEPTACLES CIRCUITS EXCEEDING TOTAL LENGTH OF 100 FEET BETWEEN DEVICE AND PANEL.

G. REFER TO THE MECHANICAL AND PLUMBING PLANS FOR EXACT EQUIPMENT LOCATIONS.

H. ALL PENETRATIONS AND ROUTING PATHS OF EXPOSED CONDUIT SHALL BE COORDINATED AND REVIEWED BY THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION.

I. PROVIDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR FOR EACH BRANCH CIRCUIT, DO NOT SHARE NEUTRAL CONDUCTORS.

J. UTILIZE NO MORE THAN SIX CURRENT CARRYING CONDUCTORS PER BRANCH CIRCUIT HOMERUN.

K. CONTRACTOR TO INSTALL BOXES, RACEWAYS WITH PULL STRINGS FROM DEVICE LOCATION TO SERVER ROOM FOR ALL DATA DROPS. COORDINATE WITH WOODBURN IT PERSONNEL FOR STANDARD MEANS AND METHODS FOR IT INSTALLATION. CABLE, DEVICES AND TERMINATIONS BY OTHERS.

L. ALL ELECTRICAL PANELS ARE EXISTING UNLESS OTHERWISE NOTED.

NOTES:

1. REPLACE WITH GFCI RECEPTACLE.

2. RECEPTACLE FOR COPIER.

3. POWER AND DATA FOR MONITORS. REFER TO ARCHITECTURAL DRAWINGS FOR MOUNTING HEIGHTS. BACKBOXES BY OTHERS. COORDINATE WITH AV INTEGRATOR BEFORE INSTALLATION. REFER TO AV DRAWINGS FOR FURTHER INFORMATION.

4. SWITCH FOR MOTORIZED SHUTTER TO BE CONCEALED IN CASEWORK.

5. EQUIPMENT CONNECTION: MOTORIZED SHUTTER.

6. REFER TO ARCHITECTURAL DRAWINGS FOR RECEPTACLE LOCATIONS/MOUNTING HEIGHTS WITHIN CASEWORK OF COUNCIL CHAMBERS STAFF DESK.

7. INTERCEPT EXISTING CIRCUIT WHERE NEW RECEPTACLE IS SHOWN.

8. EQUIPMENT CONNECTION: ACCESS CONTROL HEADEND. PROVIDE 20A/1P BREAKER IN PANEL D2

9. EQUIPMENT CONNECTION: AV NETWORK HEADEND.

10. DASHED REGION IS FED BY PANEL A. CONTRACTOR TO VERIFY RECEPTACLE/CIRCUIT DESIGNATION TO VERIFY CAPACITY. AFTER EXTENSIVE RENOVATION, SPARED CIRCUITS ARE TO BE USED FOR ALL NEW RECEPTACLES SHOWN IN THIS AREA. 6 RECEPTACLES PER CIRCUIT IS ALLOWED FOR SALVAGED CIRCUITS PROVIDE SEPARATE NEUTRALS. PLEASE SUBMIT CIRCUITING INTENT FOR PAE'S REVIEW BEFORE INSTALLATION.

11. FLOORBOX TO BE PROVIDED SHALL BE FSR-FL-600-6 OR APPROVED EQUAL.

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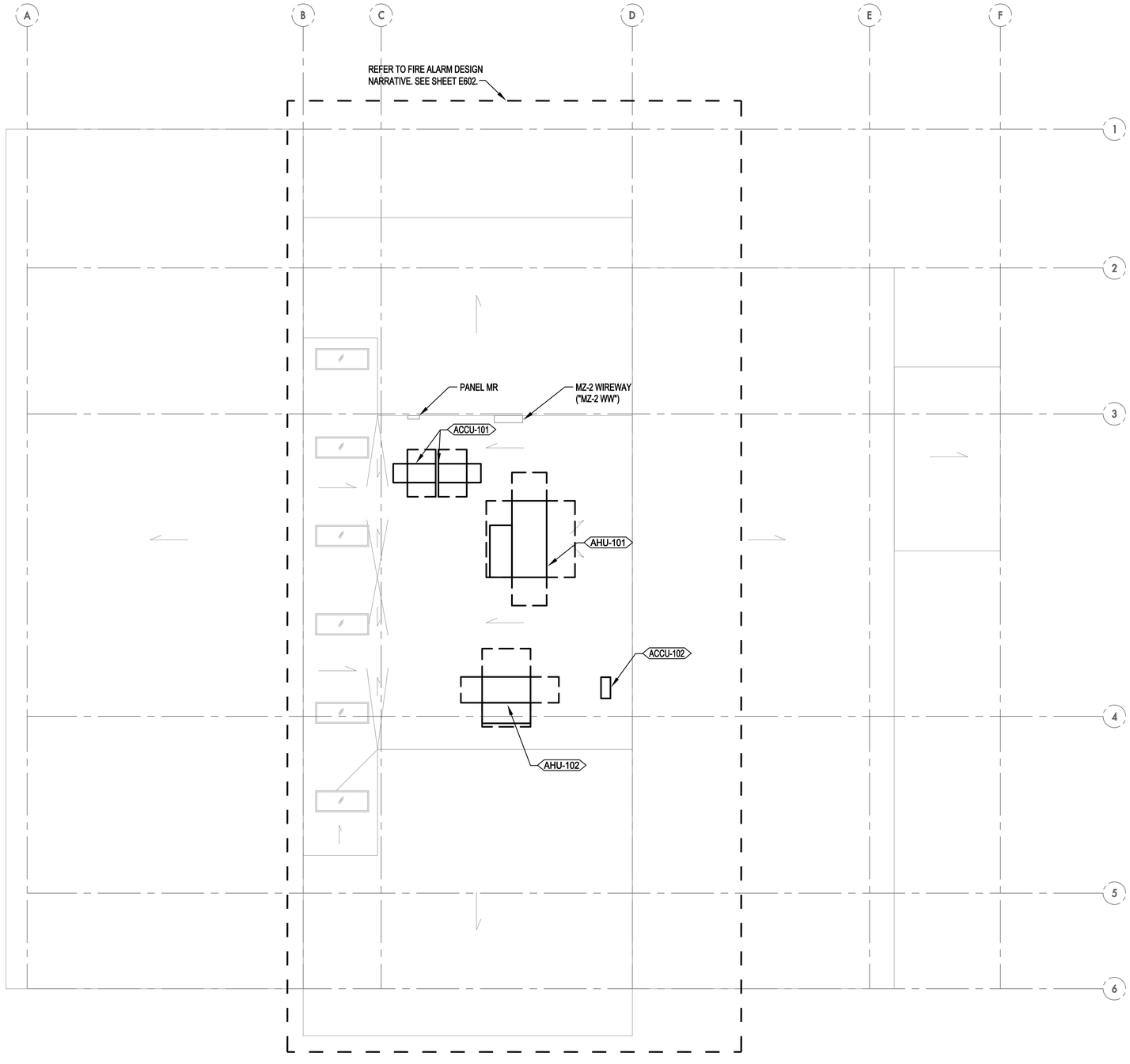
100% CD		12/14/18

GROUND FLOOR PLAN - POWER & SIGNAL

Scale 1/8" = 1'-0"
Date DECEMBER 14, 2018
Sheet No. E301



1 / E302 FLOOR PLAN - ROOF - POWER & SIGNAL

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

GENERAL NOTES:

A. ALL ELECTRICAL EQUIPMENT IS EXISTING UNLESS OTHERWISE NOTED.

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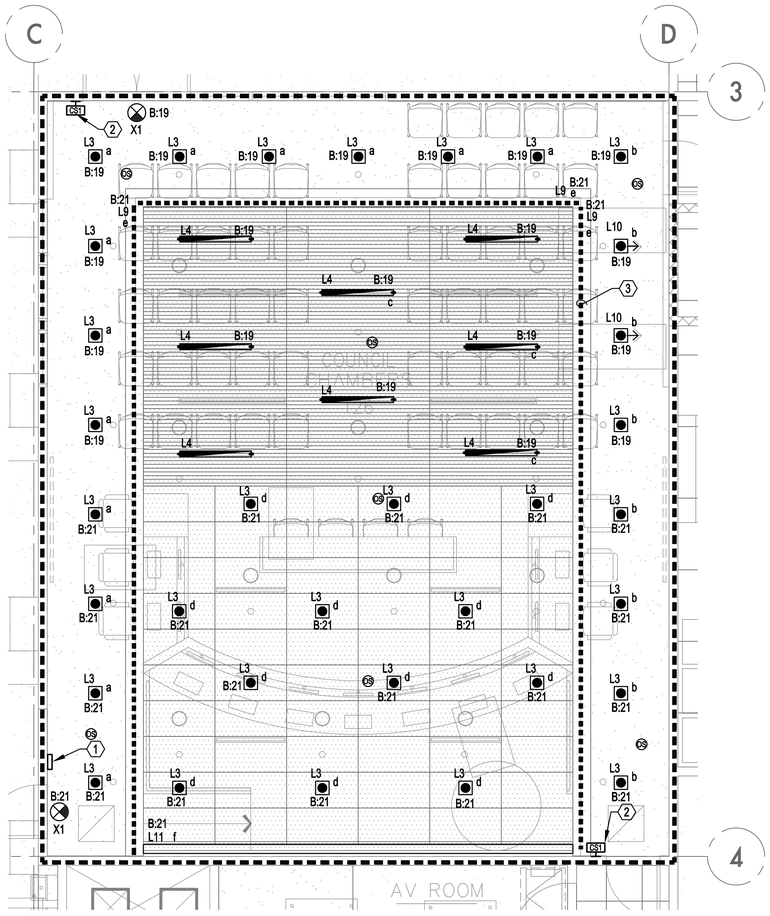
ROOF PLAN - POWER & SIGNAL

Scale	1/8" = 1'-0"
Date	DECEMBER 14, 2018
Sheet No.	E302



1 E601 ENLARGED PLAN - COUNCIL CHAMBERS (126) - LIGHTING CONTROL INTENT

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

NOTES:

1. ROOM CONTROLLER BASIS OF DESIGN: ACUITY / FRESCO. POWER PACKS TO BE LOCATED IN AV ROOM 125 FOR ACCESSIBILITY. REFER TO DETAIL 2 FOR ROOM CONTROL INTENT. PROVIDE 120V FOR FRESCO POWER SUPPLY.
2. CONTROL STATIONS WITHIN COUNCIL CHAMBERS BASIS OF DESIGN: 4-SCENE SELECTOR NPODM 4S DX OR APPROVED EQUAL.
3. BASED ON AS-BUILT DATA, ALL LIGHTING IN CHAMBERS TO BE FED BY CIRCUITS B-19 & B-21. CIRCUITS C-1 & C-3 TO BE UTILIZED FOR OTHER LOADS.

LIGHTING RELAY SCHEDULE

LOAD INFORMATION				POWER PANEL INFORMATION			INPUT CONTROLLING DEVICES					NOTES
RELAY PANEL	RELAY	LOAD (VA)	DESCRIPTION	PANEL	CIRCUIT	EMERGENCY SOURCE	ON/OFF OR DIMMING	OCCUPANT CONTROLS	PHOTO CELL	TIME CLOCK	OCC SENSOR	
LCP-1	r101	160	VESTIBULE NORTH (163)	INV-1	1	Y	ON/OFF	O	-	Y	O	2
LCP-1	r102	80	VESTIBULE NORTH EXTERIOR	INV-1	1	Y	ON/OFF	O	Y	Y	V	1,3
LCP-1	r103	160	VESTIBULE SOUTH (164)	INV-1	2	Y	ON/OFF	O		Y	O	2
LCP-1	r104	80	VESTIBULE SOUTH EXTERIOR	INV-1	2	Y	ON/OFF	O	Y	Y	V	1,3
LCP-1	r105	400	HALLWAY 118	INV-1	3	Y	ON/OFF	O		Y	O	2
LCP-1	r106	200	HALLWAY 162	INV-1	3	Y	ON/OFF	O		Y	V	2
LCP-1	r107	160	WEST SPOTLIGHTS	INV-1	4	Y	ON/OFF	O		Y	V	2
LCP-1	r108	400	EAST SPOTLIGHTS	INV-1	4	Y	ON/OFF	O		Y	V	2
LCP-1	r109	440	N. STAIRS(032)/S. STAIRS (031)	INV-1	5	Y	ON/OFF	O	-	Y	O	2
LCP-1	r110	240	SOFFIT LIGHTS	INV-1	6	Y	ON/OFF	O		Y	V	2
LCP-1	r111	240	HALLWAY 128	INV-1	6	Y	ON/OFF	O		Y	O	2
LCP-1	r112	0	SPARE									
LCP-1	r113	0	SPARE									
LCP-1	r114	0	SPARE									
LCP-1	r115	0	SPARE									

GENERAL NOTES:

A. OCCUPANT CONTROLS: SWITCHES/DIMMERS: SEE PLANS FOR LOCATIONS, QUANTITIES AND TYPES. O = LOW VOLTAGE PUSHBUTTON OVERIDE SWITCH

B. PROVIDE OVERRIDE SWITCH(ES) AS SHOWN ON DRAWINGS

C. RELAYS ON AN EMERGENCY POWER SOURCE SHALL BE IN A SEPARATE COMPARTMENT WITHIN THE LRC PANEL OR IN A COMPLETELY SEPARATE ENCLOSURE PER CODE.

D. OCC SENSOR: O = OCCUPANCY SENSOR CONTROL. MANUAL ON/OFF AND AUTO ON/OFF.

E. OCC SENSOR: V = VACANCY SENSOR CONTROL. MANUAL ON/OFF AND AUTO OFF.

NOTES:

1. LIGHTING TO OPERATE FROM DUSK UNTIL 12:00AM BY PHOTOCELL AND TIMECLOCK. REVERT TO OCCUPANCY CONTROL DURING NON-OPERATIONAL CYCLE. OCCUPANCY SENSOR IN HALLWAY 118 TO TIME OUT EXTERIOR LIGHTS DURING AFTER HOURS.
2. LIGHTING ON BY TIMECLOCK AT 6AM, SWEEP OFF AT 6PM. REVERTS TO OCCUPANCY CONTROL AFTER HOURS.
3. PHOTOCELL SENSOR TO BE INSTALLED ON ROOF IN THE NORTH FACING DIRECTION

3 E601 LIGHTING RELAY SCHEDULE

SCALE: NONE

PRESET & ZONE DESIGNATIONS

ZONE	ZONE DESCRIPTION	PRESET	1	2	3	4	ON	OFF	TIMECLOCK	OCCUPANCY SENSOR
a	PERIMETER DOWNLIGHTS (NORTH & WEST)		25%	25%	50%	25%	100%	0%	N	Y
b	PERIMETER DOWNLIGHTS (EAST)		50%	25%	50%	25%	100%	0%	N	Y
c	CHAMBER SEATING (LINEAR PENDANT)		50%	25%	50%	25%	100%	0%	N	Y
d	CHAMBER COUNCIL SEATING DOWNLIGHTS		25%	25%	50%	100%	100%	0%	N	Y
e	CHAMBER CEILING ACCENT UPLIGHT		25%	25%	50%	100%	100%	0%	N	Y
f	CHAMBER COUNCIL SEATING WALLWASH		25%	25%	50%	100%	100%	0%	N	Y

GENERAL NOTES:

A. PRESET CONTROLLER BASIS OF DESIGN: FRESCO WITH NLIGHT (NPODM 4S DX) 4 SCENE WALL STATIONS AS AUXILLARY CONTROLS

B. SCHEDULED DIMMING EVENTS:

- NOT APPLICABLE UNLESS STATED OTHERWISE BY OWNER.

C. COORDINATE FINAL SCHEDULE AND DIMMING LEVELS WITH OWNER PRIOR TO FINAL PROGRAMMING.

D. PROVIDE MAIN UNIT & WALL CONTROL STATIONS AT LOCATIONS SHOWN ON PLAN.

E. PRESET 1: PRESENTATION PRESET

F. PRESET 2: LOW PRESET

G. PRESET 3: MID PRESET

H. PRESET 4: PERIMETER DOWNLIGHTS (EAST) PRESENTATION PRESET

I. PRESET 5: FULL ON

J. PRESET 6: FULL OFF

2 E601 LIGHTING ZONE PRESET SCHEDULE

SCALE: NONE

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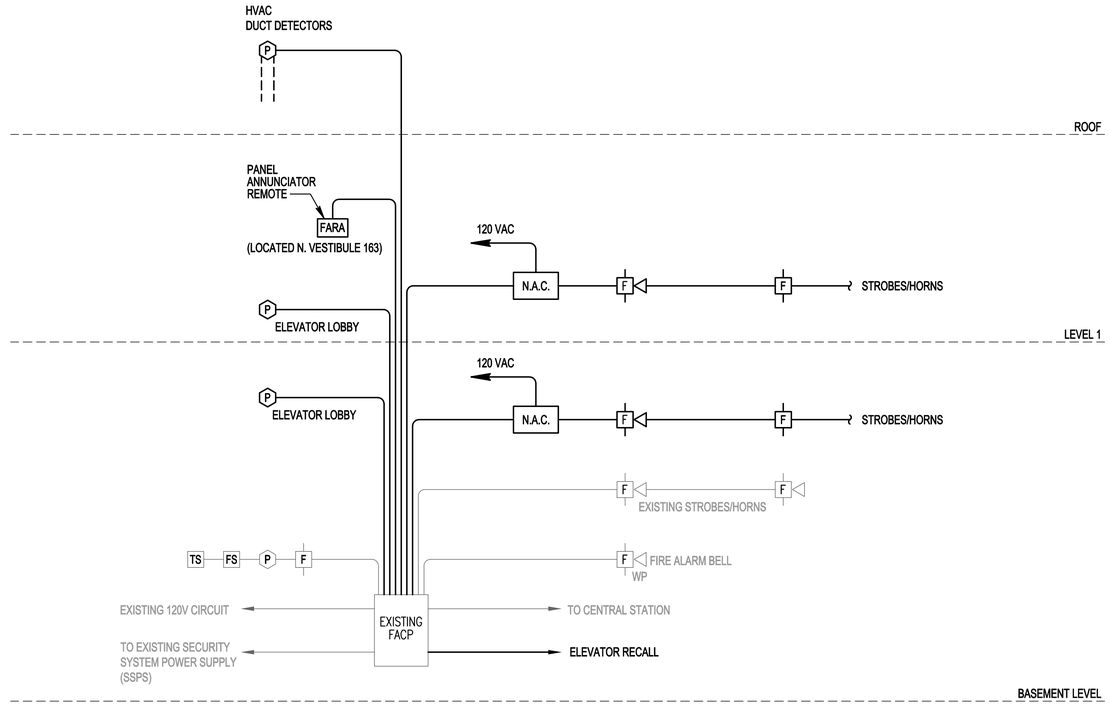
ENLARGED PLANS - LIGHTING PRESETS AND CONTROLS

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E601



1 / E602 FIRE ALARM SYSTEM RISER

SCALE: NONE

FIRE ALARM PROJECT SCOPE:

FIRE ALARM SYSTEM SCOPE IS A DEFERRED SUBMITTAL PROVIDE SYSTEM MODIFICATIONS NOTED BELOW.

EXISTING FA SYSTEM:

- EXISTING FA SYSTEM CONSISTS OF THE FOLLOWING COMPONENTS.
  - FA PANEL: SILENT KNIGHT SERIES 5700
  - SYSTEM INPUTS:
    - FIRE SPRINKLER TAMPER AND FLOW
    - FIRE ALARM PULL STATION (AT PANEL)
    - FIRE SMOKE DETECTOR (AT PANEL)
  - SYSTEM OUTPUTS:
    - NOTIFICATION:
      - INTERIOR: HORN STROBE TO EXISTING LOCATIONS (2 LOCATIONS).
      - EXTERIOR: HORN STROBE TO EXTERIOR LOCATION (WATER FLOW).
    - CENTRAL DISPATCH: TWO LINE DIALER OUT TO CITY OF WOODBURN CONTRACTED CENTRAL STATION MONITORING.
    - SECURITY INTERFACE: DOOR SECURITY (DOOR LOCKS).

PROJECT SCOPE OF WORK:

- GENERAL:
  - PROVIDE MODIFICATIONS TO EXISTING FA SYSTEM TO ACCOMMODATE THE NEW HVAC SYSTEM AND INTERIOR SPACE RENOVATIONS.
- FIRE ALARM PANEL:
  - RELOCATE EXISTING FA PANEL TO NEW LOCATION IN BASEMENT IN AN ACCESSIBLE UNOBSTRUCTED LOCATION.
- FIRE ALARM REMOTE ANNUNCIATOR:
  - PROVIDE REMOTE ANNUNCIATOR. LOCATE IN NORTH VESTIBULE 163
- SYSTEM INPUTS:
  - RELOCATE EXISTING MANUAL PULL STATION WITH FA PANEL.
  - RELOCATE EXISTING SMOKE DETECTOR WITH FA PANEL
  - PROVIDE NEW SMOKE DETECTION AT ELEVATOR LOBBIES AND MACHINE ROOM FOR ELEVATOR RECALL.
  - PROVIDE NEW SMOKE DETECTION IN RETURN AIR DUCTS OF HVAC UNITS >2000CFM.
- SYSTEM OUTPUTS:
  - ELEVATOR RECALL:
    - PROVIDE INTERFACE FOR ELEVATOR RECALL.
  - ADDED NOTIFICATION:
    - ADD AUDIBLE NOTIFICATION (HORN) THRU OUT FACILITY.
    - ADD VISUAL NOTIFICATION (STROBE) THRU OUT FACILITY IN ALL PUBLIC SPACES.
  - HVAC SHUT DOWN (SMOKE DETECTION):
    - COORDINATE SHUT DOWN OF HVAC UNITS WITH MECHANICAL CONTRACTOR.
    - ALARM HVAC SHUT DOWN AT FACP.
  - NAC PANELS:
    - ADD NAC PANELS TO SUPPORT ADDED LOAD +10% SPARE.
  - SECURITY:
    - MAINTAIN EXISTING INTERFACE
  - CENTRAL STATION (CS) MONITORING
    - UPDATE CS WITH NEW ADDED ALARM POINTS.
- COMMISSION FA SYSTEM
  - INSURE ALL NEW AND EXISTING SYSTEM COMPONENTS ARE OPERATIONAL.
  - PERFORM OFAT (OPERATIONAL AND FUNCTIONAL ACCEPTANCE TESTING) OF THE SYSTEM, NEW AND EXISTING COMPONENTS.

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DETAILS - FA RISER AND NARRATIVE

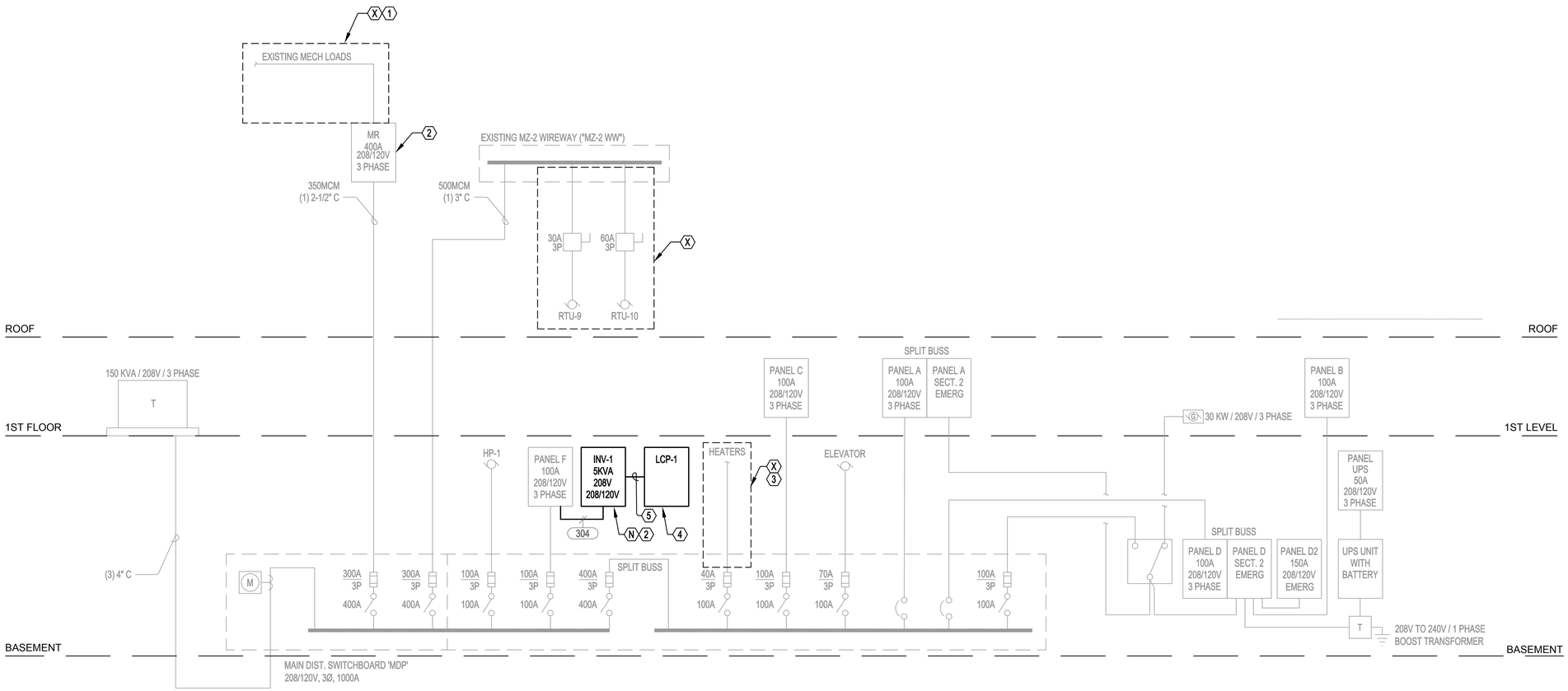
Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E602

NOMINAL AMPACITY	FEEDER SCHEDULE COPPER: 3 PHASE, 3 WIRE + GROUND TAG	CONDUIT SIZE (MIN)	PHASE CONDUCTORS	GROUND CONDUCTOR
20	203	1/2"	(3) #12	#12
30	303	1/2"	(3) #10	#10

NOTES:
1. REFER TO SPECIFICATIONS FOR INSULATION TYPE PER WIRE SIZE.
2. MINIMUM CONDUIT SIZES IDENTIFIED MEET MAXIMUM 40% FILL FOR EMT, RMC AND PVC SCHEDULE 40.
3. FOR FEEDER RATINGS 100AMPS OR LESS, ACTUAL AMPACITY IS CALCULATED BY THOSE GIVEN IN NEC 310.15(B)(16), 60DEG C.
4. FOR FEEDER RATINGS GREATER THAN 100AMPS, ACTUAL AMPACITY IS CALCULATED BY THOSE GIVEN IN NEC 310.15(B)(16), 75DEG C.

FEEDER SCHEDULE COPPER: 3 PHASE, 4 WIRE + GROUND TAG	CONDUIT SIZE (MIN)	PHASE & NEUTRAL CONDUCTORS	GROUND CONDUCTOR
204	1/2"	(4) #12	#12
304	3/4"	(4) #10	#10

NOTES:
1. REFER TO SPECIFICATIONS FOR INSULATION TYPE PER WIRE SIZE.
2. MINIMUM CONDUIT SIZES IDENTIFIED MEET MAXIMUM 40% FILL FOR EMT, RMC AND PVC SCHEDULE 40.
3. ALL NEUTRAL CONDUCTORS ARE CONSIDERED CURRENT CARRYING, THEREFORE AMPACITY ADJUSTMENTS HAVE BEEN INCLUDED IN ACCORDANCE WITH NEC TABLE 310.15(B)(3)(a) TO ACCOMMODATE FOUR (4) CURRENT CARRYING CONDUCTORS IN A SINGLE RACEWAY.
4. ADJUSTED CONDUCTOR AMPACITIES ARE CALCULATED BASED ON THOSE GIVEN FOR 90DEG C CONDUCTORS IN ACCORDANCE WITH NEC 310.15(B) AND TABLE NEC 310.15(B)(16). FOR FEEDER RATINGS 100AMPS OR LESS, THE ADJUSTED AMPACITY SHALL NOT EXCEED THE 60DEG C RATING. FOR FEEDER RATINGS GREATER THAN 100AMPS, ACTUAL AMPACITY SHALL NOT EXCEED THE 75DEG C RATING.



GENERAL NOTES:

A. ALL EQUIPMENT IS EXISTING TO REMAIN UNLESS OTHERWISE NOTED.

PANEL MR EXISTING LOAD SUMMARY:

PHASE A:	30.4KVA
PHASE B:	30.5KVA
PHASE C:	30.5KVA
TOTAL AMPS =	253.9A

NOTES:

1. ALL MECHANICAL LOADS TO BE DEMOLISHED BACK TO THE PANEL.

2. REFER TO PANEL SCHEDULE ON SHEET E801 FOR EXISTING & NEW LOAD INFORMATION.

3. UPDATE TAG AT MDP TO DENOTE SPARE.

4. REFER TO THE LIGHTING CONTROL PANEL SCHEDULE SHEET E601 FOR ADDITIONAL CIRCUITRY AND CONTROL REQUIREMENTS.

5. LIGHTING CIRCUITS TO RELAY PANEL.

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ONE LINE DIAGRAM - POWER & SIGNAL

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E701

EXISTING LAYOUT EXISTING PANEL MR

DESIGNATION: MR (E) ⬡1				VOLTAGE: 208Y/120V - 3 Ph - 4 Wire							BUS RATING(A): 300
AVAILABLE FAULT(A):		MAIN: MLO				MOUNTING: Surface					ENCLOSURE: NEMA 1
DESCRIPTION		DEMAND	VA	BKR A/P	CKT	PH	CKT	BKR A/P	VA	DEMAND	DESCRIPTION
AC-1		Equipment	4600	50/3	1	A	2	50/3	4600	Equipment	AC-2
			4600		3	B	4		4600		
			4600		5	C	6		4600		
AC-3		Equipment	3500	45/3	7	A	8	45/3	3500	Equipment	AC-4
			3500		9	B	10		3500		
			3500		11	C	12		3500		
AC-5		Equipment	3500	45/3	13	A	14	45/3	3500	Equipment	AC-6
			3500		15	B	16		3500		
			3500		17	C	18		3500		
AC-7		Equipment	3500	45/3	19	A	20	45/3	3500	Equipment	AC-8
			3500		21	B	22		3500		
			3500		23	C	24		3500		
SPACE					25	A	26				SPACE
SPACE					27	B	28	15/2	100	Equipment	PANEL MR HTR
SPACE					29	C	30		100		
					31	A	32				
					33	B	34				
					35	C	36				
					37	A	38				
					39	B	40				
					41	C	42				

DEMAND CATEGORY	A PH (VA)	B PH (VA)	C PH (VA)	TOTAL (VA)
Equipment	30200	30300	30300	90800
DESIGN LOAD PHASE SUB-TOTAL	30200	30300	30300	90800

TOTAL CONNECTED LOAD VA:	90800
MAX CONNECTED PHASE AMPS:	252.3
TOTAL DESIGN LOAD VA:	90800
MAX DESIGN PHASE AMPS:	252.3

NOTES:

NEW LAYOUT EXISTING PANEL MR

DESIGNATION: MR(E)				VOLTAGE: 208Y/120V - 3 Ph - 4 Wire							BUS RATING(A): 400
AVAILABLE FAULT(A): 19996		MAIN: MLO				MOUNTING: Surface					ENCLOSURE: NEMA 1
DESCRIPTION		DEMAND	VA	BKR A/P	CKT	PH	CKT	BKR A/P	VA	DEMAND	DESCRIPTION
FCU-0-001/005/10/15/20/25/30/35/40		Equipment	696	20/2	1	A	2	40/3	3158	Equipment	ACCU-101 (FRAME 1)
			696		3	B	4		3158		
HRP-001		Equipment	21	20/2	5	C	6		3158		
			21		7	A	8	70/3	7241	Equipment	ACCU-101 (FRAME 2)
FCU-1-005/010/015/020/025/040		Equipment	538	20/2	9	B	10		7241		
			538		11	C	12		7241		
FCU-1-030/35/45/50/55/60/65/70/75		Equipment	872	20/2	13	A	14	40/3	2894	Equipment	ACCU-102
			872		15	B	16		2894		
FCU-1-080/085/090/095/125		Equipment	444	20/2	17	C	18		2894		
			444		19	A	20	90/3	7926	Motor - Largest	AHU-101
FCU-1-100/105/110/115/120		Equipment	772	20/2	21	B	22		7926		
			772		23	C	24		7926		
HRP-101/102/103/104/105		Equipment	40	20/2	25	A	26				SPACE
			40		27	B	28	15/2	100	Equipment	PANEL MR HTR
BC CONTROLLER		Equipment	100	20/1	29	C	30		100		
DDC PANEL 1ST FLOOR		Equipment	200	20/1	31	A	32	50/3	4368	Equipment	AHU-102
DDC PANEL PENTHOUSE		Equipment	200	20/1	33	B	34		4368		
SPARE				20/1	35	C	36		4368		
SPARE				20/1	37	A	38				SPACE
SPARE				20/1	39	B	40				SPACE
SPARE				20/1	41	C	42				SPACE

DEMAND CATEGORY	A PH (VA)	B PH (VA)	C PH (VA)	TOTAL (VA)
Equipment	19934	20879	19636	60449
Motor - Largest	9908	9908	9908	29723
DESIGN LOAD PHASE SUB-TOTAL	29841	30787	29544	90172

TOTAL CONNECTED LOAD VA:	84227
MAX CONNECTED PHASE AMPS:	239.9
TOTAL DESIGN LOAD VA:	90172
MAX DESIGN PHASE AMPS:	256.4

NOTES:

DESIGNATION: INV-1	INPUT VOLTAGE: 208V OUTPUT VOLTAGES: 120V / 208V
INVERTER RATING: 5 KVA	ENCLOSURE: NEMA 1

DESCRIPTION	DEMAND CATEGORY	V	VA	BKR A/P	CKT
VESITBULE NORTH (163)/NORTH EXTERIOR (r101 & r102)	Lighting	120	240	20/1	1
VESITBULE SOUTH (163)/SOUTH EXTERIOR (r103 & r104)	Lighting	120	240	20/1	2
HALLWAY (118/162) (r105 & 106)	Lighting	120	600	20/1	3
WEST & EAST SPOTLIGHTS (r107 & r108)	Lighting	120	560	20/1	4
NORTH STAIRS (032)/SOUTH STAIRS (031) (r109)	Lighting	120	440	20/1	5
SOFFIT LIGHTS & HALLWAY (128) (r110 & r111)	Lighting	120	480	20/1	6
HALLWAY (138)	Lighting	120	560	20/1	7
SPARE		120		20/1	8
SPARE		120		20/1	9
SPARE		120		20/1	10

DEMAND CATEGORY	A ph (VA)
Lighting	3120
CONNECTED LOAD:	3120

TOTAL CONNECTED LOAD (AT 120V)	VA:	3120
	AMPS:	15.0
TOTAL DESIGN LOAD (AT 120V)	VA:	3900
	AMPS:	18.8

GENERAL NOTES:

A. ALL EQUIPMENT IS EXISTING TO REMAIN UNLESS OTHERWISE NOTED.

PANEL MR EXISTING LOAD SUMMARY:
PHASE A: 30.2 KVA
PHASE B: 30.3 KVA
PHASE C: 30.3 KVA
TOTAL AMPS = 252.3 A

PANEL MR NEW LOAD SUMMARY:
PHASE A: 30.34 KVA
PHASE B: 31.02 KVA
PHASE C: 30.68 KVA
TOTAL AMPS = 258.3 A

⬡ NOTES:

1. PROVIDE NEW BREAKERS AS SHOWN UNLESS OTHERWISE NOTED.

DESIGNATION: PANEL D2 (E)				VOLTAGE: 208Y/120V - 3 Ph - 4 Wire							BUS RATING(A): 100
AVAILABLE FAULT(A): 17972		MAIN: MLO				MOUNTING: Surface					ENCLOSURE: NEMA 1
DESCRIPTION		DEMAND	VA	BKR A/P	CKT	PH	CKT	BKR A/P	VA	DEMAND	DESCRIPTION
WASTEWATER LIFT STATION CP (E)		Equipment	1000	30/3	1	A	2	20/1	500	Lighting	ELECTRICAL LTG RM (E)
			1000		3	B	4	20/1	180	Receptacles	ELECTRICAL RM REC (E)
			1000		5	C	6	20/1	650	Equipment	SUMP PUMP (E)
A/C GOODMAN (E)		Equipment	750	20/2	7	A	8	30/2	900	Equipment	WASTEWATER LIFT ECP1/SF1/EF1/EDH1 (E)
			750		9	B	10		900		
A/C FUJITSU (E)		Equipment	750	30/2	11	C	12	20/1	500	Equipment	FIRE ALARM SYSTEM (E)
			750		13	A	14				SPACE
ACCESS CONTROL		Equipment	500	20/1	15	B	16	20/2	750	Equipment	AC-02
LIGHTING CONTROL PANEL		Equipment	500	20/1	17	C	18		750		

DEMAND CATEGORY	A PH (VA)	B PH (VA)	C PH (VA)	TOTAL (VA)
Equipment	3400	3900	4150	11450
Lighting	625	0	0	625
Receptacles	0	180	0	180
DESIGN LOAD PHASE SUB-TOTAL	4025	4080	4150	12255

TOTAL CONNECTED LOAD VA:	12130
MAX CONNECTED PHASE AMPS:	34.6
TOTAL DESIGN LOAD VA:	12255
MAX DESIGN PHASE AMPS:	34.6

NOTES:

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Issue	Revision	Date
100% CD		12/14/18

PANEL SCHEDULES

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E801

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

EQUIPMENT DESCRIPTIONS			ELECTRICAL CHARACTERISTICS							CONNECTION CHARACTERISTICS				FEEDER CHARACTERISTICS			PANEL INFORMATION	SCCR	NOTES
TAG	DESCRIPTION	LOCATION	KW	HP	FLA	MCA	MOCP	VOLTS	PHASE	VFD	1-POINT CONNECT	STARTER DIVISION	DISCONNECT DIVISION	CONDUIT DIA (INCH)	PHASE CONDUCTORS	GROUND CONDUCTOR	PANEL NAME	AVAILABLE FAULT AT EQUIPMENT (AMPS)	
DDC PANEL	CONTROL PANEL - 1ST FLOOR													(1) 3/4"	(2) #12	#12	MR		
DDC PANEL	CONTROL PANEL - PENTHOUSE													(1) 3/4"	(2) #12	#12	MR		
AHU-101	DOAS AIR HANDLING UNIT	ROOF			64.3	80.4	90	208	3	Y		23	26	(1) 1-1/4"	(3) #3	#8	MR	20,000	
	-COMPRESSOR 1				16.9			208	3										
	-COMPRESSOR 2				15.6			208	3										
	-CONDENSER FANS			0.33	2.6			208	1										
	-SUPPLY FAN			5.00	16.7			208	3										
	-RETURN/RELIEF FAN			3.00	10.6			208	3										
	-ENERGY RECOVERY			0.09	1.3			208	1										
	-COMBUSTION			0.05	0.6			208	1										
AHU-102	AIR HANDLING UNIT	ROOF			36.4	45.5	50	208	3	Y		23	26	(1) 3/4"	(3) #6	#10	MR	20,000	
	-COMPRESSOR 1				20.4			208	3										
	-CONDENSER FAN			0.33	2.6			208	1										
	-SUPPLY FAN			2.0	7.5			203	3										
	-RETURN/RELIEF FAN			1.0	4.6			208	3										
	-COMBUSTION			0.1	1.3			208	1										
FCU-0-001	SPLIT SYSTEM AC INDOOR-	IT STORAGE 023	0.228		1.12	1.40		208	1	Y		23	26						
	-CONDENSATE PUMP																		
FCU-0-005	SPLIT SYSTEM AC INDOOR-	CONF ROOM 004	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-010	SPLIT SYSTEM AC INDOOR-	RECORDS STORAGE 005	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-015	SPLIT SYSTEM AC INDOOR-	TRAINING AREA 006	0.144		0.56	0.71		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-020	SPLIT SYSTEM AC INDOOR-	MUSEUM OFFICE 007	0.144		0.56	0.71		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-025	SPLIT SYSTEM AC INDOOR-	STORAGE 007	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-030	SPLIT SYSTEM AC INDOOR-	STORAGE 009	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-035	SPLIT SYSTEM AC INDOOR-	OPEN STORAGE 010	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-0-040	SPLIT SYSTEM AC INDOOR-	IT OFFICE 016	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-005	SPLIT SYSTEM AC INDOOR-	CITY ADMIN 101	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-010	SPLIT SYSTEM AC INDOOR-	MAYOR 102	0.150		1.06	1.32		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-015	SPLIT SYSTEM AC INDOOR-	LEGAL ASSISTANT 106	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-020	SPLIT SYSTEM AC INDOOR-	FINANCE DEPT 107	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-025	SPLIT SYSTEM AC INDOOR-	FINANCE DIRECTOR 109	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-030	SPLIT SYSTEM AC INDOOR-	ASST CITY ATTORNEY 110	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-035	SPLIT SYSTEM AC INDOOR-	OFFICE 113	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		
FCU-1-040	SPLIT SYSTEM AC INDOOR-	ACCTG MANAGER 108	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
	-CONDENSATE PUMP																		

GENERAL NOTES: (SOME MAY NOT BE USED ON THIS SHEET)

A. REFER TO PANEL SCHEDULES FOR OVERCURRENT PROTECTION CHARACTERISTICS AND CIRCUIT NUMBERS.
B. COORDINATE ALL EQUIPMENT CONNECTION REQUIREMENTS WITH INSTALLING CONTRACTOR PRIOR TO THE INSTALLATION OF ANY ELECTRICAL WORK.
C. VFD'S ARE FURNISHED BY DIVISION 23. INSTALL VFD AND PROVIDE LINE AND LOAD SIDE FEEDERS IN ELECTRICAL WORK.
D. COMBINATION STARTER/DISCONNECTS AND DISCONNECT SWITCHES SHALL BE LOCATED WITHIN SIGHT OF AND ADJACENT TO EQUIPMENT SERVED. COORDINATE INSTALLATION WITH EQUIPMENT INSTALLER.
E. NOT ALL EQUIPMENT IDENTIFIED HERE IS SHOWN ON FLOOR PLANS. REFER TO DRAWINGS IN OTHER DISCIPLINES FOR EQUIPMENT LOCATIONS.

NOTES: (SOME MAY NOT BE USED ON THIS SHEET)

1. MULTIPULE UNITS ARE FED FROM ONE CIRCUIT. PROVIDE INDIVIDUAL DISCONNECT AT EACH UNIT.

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M&E SCHEDULE
1 of 2

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E802

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

EQUIPMENT DESCRIPTIONS			ELECTRICAL CHARACTERISTICS							CONNECTION CHARACTERISTICS				FEEDER CHARACTERISTICS			PANEL INFORMATION	SCCR	NOTES
TAG	DESCRIPTION	LOCATION	KW	HP	FLA	MCA	MOCP	VOLTS	PHASE	VFD	1-POINT CONNECT	STARTER DIVISION	DISCONNECT DIVISION	CONDUIT DIA (INCH)	PHASE CONDUCTORS	GROUND CONDUCTOR	PANEL NAME	AVAILABLE FAULT AT EQUIPMENT (AMPS)	
FCU-1-045	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	COMM RELATIONS MANAGER 112	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-050	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	COMM DEVT 114	1.500		1.06	1.32		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-055	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	COMM DEVT DIRECTOR 115	0.144		0.56	0.71		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-060	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	COPY 116	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-065	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	SENIOR PLANNER 117	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-070	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	COMM RELATIONS MANAGER 112	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-075	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	HALLWAY 162	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-080	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	ECON DEV DIRECTOR 134	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-085	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	SUPPORT STAFF 135	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-090	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	ASST CITY ADMIN 136	0.144		0.56	0.71		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-095	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	CHAMBER COMM 149	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-100	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	PARKS & REC 160	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-105	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	COMM COORD 158	1.500		1.06	1.32		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-110	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	ANALYST 157	0.450		2.65	3.30		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-115	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	CONF ROOM 120	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-120	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	CONF ROOM 124	0.030		0.20	0.25		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
FCU-1-125	SPLIT SYSTEM AC INDOOR- -CONDENSATE PUMP	CONF ROOM 148	1.500		1.06	1.32		208	1	Y		23	26	(1) 3/4"	(2) #12	#12	MR	10,000	1
ACCU-101	AIR COOLED CONDENSING UNIT	ROOF																	
	FRAME 1				24.4	28.5	40	208	3				26	(1) 3/4"	(3) #8	#10	MR	20,000	
	FRAME 2				54.2	60.3	70	208	3					(1) 1-1/4"	(3) #3	#8	MR	20,000	
ACCU-102	AIR COOLED CONDENSING UNIT	ROOF												(1) 3/4"	(3) #6	#10	MR	20,000	
	FRAME 1				24.1	30.0	40	208	3				26	(1) 3/4"	(3) #8	#10	MR	20,000	
BC CONTROLLER	VRF BRANCH CIRCUIT CONTROLLER							120						(1) 3/4"	(2) #12	#12	MR		
HRP-001	HEAT RECOVERY UNIT		0.08		0.09			208	1				26	(1) 3/4"	(2) #12	#12	MR	10,000	1
HRP-101	HEAT RECOVERY UNIT		0.04		0.09			208	1				26	(1) 3/4"	(2) #12	#12	MR	10,000	1
HRP-102	HEAT RECOVERY UNIT		0.08		0.06			208	1				26	(1) 3/4"	(2) #12	#12	MR	10,000	1
HRP-103	HEAT RECOVERY UNIT		0.04		0.06			208	1				26	(1) 3/4"	(2) #12	#12	MR	10,000	1
HRP-104	HEAT RECOVERY UNIT		0.08		0.09			208	1				26	(1) 3/4"	(2) #12	#12	MR	10,000	1
HRP-105	HEAT RECOVERY UNIT		0.08		0.06			208	1				26	(1) 3/4"	(2) #12	#12	MR	10,000	1

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M&E SCHEDULE
2 of 2

Scale N.T.S.
Date DECEMBER 14, 2018
Sheet No. E803

GENERAL NOTES

1. THE TA DRAWINGS DESCRIBE BASE–BUILDING ACCOMMODATIONS FOR AUDIO AND VIDEO SYSTEMS, INCLUDING POWER, DATA, RACEWAY, AND MOUNTING REQUIREMENTS. THESE DRAWINGS PROVIDE COORDINATION INFORMATION BETWEEN THE ARCHITECT, ELECTRICAL, MECHANICAL, AND STRUCTURAL ENGINEERS.
2. THE AUDIO AND VIDEO SYSTEMS SHOWN IN THESE DOCUMENTS WILL BE PROVIDED AND INSTALLED BY A A/V SYSTEMS TRADE CONTRACTOR SPECIALIZING IN THESE SYSTEMS. IT IS THE RESPONSIBILITY OF THE A/V SYSTEMS CONTRACTOR TO COORDINATE THEIR INSTALLATION WORK WITH THE OTHER TRADES WORKING ON THIS PROJECT.

ARCHITECTURAL NOTES

1. ROOM DIMENSIONS ON THESE DRAWINGS HAVE BEEN TAKEN FROM THE ARCHITECTURAL DRAWINGS. ALL DIMENSIONS MUST BE VERIFIED
2, WHERE EXACT DIMENSIONS ARE NOT CALLED FOR, THE SCALE OF THESE DRAWINGS IS SUFFICIENTLY ACCURATE TO DETERMINE THE LOCATION OF EQUIPMENT, JUNCTION BOXES, OUTLET BOXES, WIREWAYS, PANELS, ETC. WHERE EXACT DIMENSIONS ARE CALLED FOR, THE REFERENCE SURFACE WILL BE THE FINAL FINISHED SURFACE INCLUDING ANY ACOUSTICAL TREATMENT.
3. PROVIDE ADDITIONAL BACKING AS REQUIRED TO SUPPORT EQUIPMENT WEIGHT WITH A SAFETY FACTOR IN COMPLIANCE WITH GOVERNING CODES.

AUDIOVISUAL SYSTEMS NOTES

1. THE DRAWINGS DO NOT SHOW ALL REQUIREMENTS OF THE SYSTEMS. THE DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY AND WHAT IS CALLED FOR (OR SHOWN) IN EITHER IS REQUIRED TO BE PROVIDED AS IF CALLED FOR IN BOTH. NOTIFY THE AV CONSULTANT OF ANY CONFLICTS BETWEEN THE DRAWINGS AND THE SPECIFICATIONS.
2. VERIFY ALL CONDUIT AND RACEWAY PATHWAYS. VERIFY ALL DEVICE LOCATIONS AND EXISTING DEVICES. IF ADDITIONAL EQUIPMENT IS REQUIRED TO COMPLETE SYSTEMS, NOTIFY OWNER OF COST AND GET APPROVAL BEFORE PROCEEDING.

DATA SYSTEMS NOTES

1. DATA OUTLETS SHOWN ON THESE DRAWINGS ARE DEDICATED TO THE AUDIO AND VIDEO SYSTEMS AND EQUIPMENT,

DRAWING LIST

CABLE LEGEND

SYMBOL	DESCRIPTION
< AN >	ANTENNA – RG–8/U
< ML >	MIC & LINE LEVEL AUDIO – 1pr 22 AWG SHLD
< CN >	CONTROL – 1pr 22 AWG SHLD
< CT >	NETWORK – CAT6A
< SC >	VIDEO – CAT6E SHLD
< SS >	70V SPEAKER LEVEL AUDIO – 1pr 16 AWG
< DV >	HDMI CABLE ASSY. LENGTH AS REQ'D
< VG >	VGA CABLE ASSY. LENGTH AS REQ'D
< CN >	CONTROL – 1pr 22 AWG SHLD

SYMBOL LEGEND

SYMBOL	DESCRIPTION	ROUGH–IN	NOTES
(S)	CEILING SPEAKER	SECURE SPEAKER TO STRUCTURE PER NEC	SUBSCRIPT DENOTES ZONE ASSIGN
M	DESK MICROPHONE	GOOSENECK MICROPHONE AND BASE	CONNECT TO INTERFACE IN DAIS RACEWAY
VM	COMPUTER MONITOR	PROVIDE WITH CUSTOM MOUNT PER SPECIFICATIONS	CONNECT TO DISTRIBUTION AMPLIFIER IN DAIS RACEWAY
MI	MICROPHONE JACK	PROVIDE WITH FSR COVER PER SPECIFICATIONS	ROUTE CABLE TO INTERFACE IN DAIS RACEWAY
M2	DUAL MICROPHONE JACK	2G BOX W/1G RING PROJECT STANDARD OUTLET HEIGHT	ROUTE CABLE TO AV RACK, BASEMENT LEVEL
DS1	SPEAKER TIMER	MASTER STATION ON DESKTOP	
DS2	SPEAKER TIMER COUNTDOWN DISPLAY	2G ARLINGTON TVBS505 POWER AND RJ–45 CONNECTION, +96" AFF	ROUTE CATEGORY CABLE TO MASTER STATION
DS3	SPEAKER TIMER COUNTDOWN DISPLAY	SPEAKER DISPLAY ON TESTIMONY TABLE TOP	ROUTE CATEGORY CABLE TO MASTER STATION
MNB	LCD MONITOR IN–WALL BOX	CHIEF PAC526. PROVIDE AC POWER IN BOX +60" AFF	PROVIDE BACKING FOR 85" MONITOR. MOUNT HDBT RECEIVER IN PAC 526
PT	P/T/Z CAMERA	2G BOX W/2G RING, ON CEILING	PROVIDE CEILING MOUNT TO PLACE BOTTOM OF CAMERA +96" AFF.
FB	FLOOR BOX	FSR FL–600–6. PROVIDE AC POWER AND NETWORK	4ea MICROPHONE JACK, HDBT TRANSMITTER, RJ–45 FOR SPEAKER TIMER
AN1	WIRELESS MIC ANTENNAE	2ea 2G BOX, 1G RING. ON CEILING. SPACE 8" TO 20" APART HORIZONTALLY.	
AN2	ALS ANTENNA	2G BOX, 1G RING. ON CEILING	
TP	10" WALL MOUNTED TOUCH PANEL	CRESTRON TSW–UMB–60–PMK PREINSTALL BRACKET RING. +48" AFF.	CRESTRON TSW–UMB–60–PMK PREINSTALL BRACKET RING. +48" AFF.

DISPLAY SCHEDULE

DISPLAY TYPE	MFG.	MODEL	ORIENTATION	SIZE (DIAGONAL)	MOUNTING HEIGHT	MOUNT MAKE AND MODEL	NOTES
FPD 1	VIEWSONIC	VG2253	LANDSCAPE	22"	BTM AT DESK	ERGOMART POS6	TRIM TUBE TO LENGTH SO THAT BOTTOM OF MONITOR IS JUST ABOVE DESKTOP
FPD 2	LG	86UH5C	LANDSCAPE	86"	+40" AFF BTM	CHIEF RLF2	PROVIDE PAC526F WITH AC POWER & NETWORK
FPD 3	LG	55UH5C	LANDSCAPE	55'	+60" AFF BTM	CHIEF MSTU	PROVIDE PAC526F WITH AC POWER & NETWORK FOR DIGITAL SIGNAGE PLAYER

ASSISTIVE LISTENING SYSTEM (ALS) REQUIREMENTS

SEATING CAPACITY IN ASSEMBLY AREAS	MINIMUM NUMBER OF RECEIVERS REQUIRED	MINIMUM NUMBER OF RECEIVERS TO BE HEARING AID COMPATIBLE
50 OR LESS	2	2
51 TO 200	2, PLUS 1 PER 25 SEATS OVER 50 SEATS	2
201 TO 500	2, PLUS 1 PER 25 SEATS OVER 50 SEATS	1 PER 4 RECEIVERS
501 TO 1000	20, PLUS 1 PER 33 SEATS OVER 500 SEATS	1 PER 4 RECEIVERS
1001 TO 2000	35, PLUS 1 PER 50 SEATS OVER 1000 SEATS	1 PER 4 RECEIVERS
OVER 2000	55, PLUS 1 PER 100 SEATS OVER 2000 SEATS	1 PER 4 RECEIVERS

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AUX	LINE LEVEL AUDIO
CKT	CIRCUIT
DED	DEDICATED
FBOIC	FURNISHED BY OTHERS, INSTALLED BY CONTRACTOR
G, GND	GROUND
J–BOX	JUNCTION BOX
LINE	LINE LEVEL AUDIO
L/R	STEREO LINE LEVEL AUDIO
M, MIC	MICROPHONE LEVEL AUDIO
NIC	NOT IN CONTRACT
PBO	PROVIDED BY OTHERS
LAN	LOCAL AREA NETWORK
PNL	PANEL
R	RACEWAY
RGBHV	RED/GRN/BLU + H/V SYNC
RO	RACEWAY ONLY
SPECS	SPECIFICATIONS
TYP	TYPICAL
V	VOLT
W	WATTS

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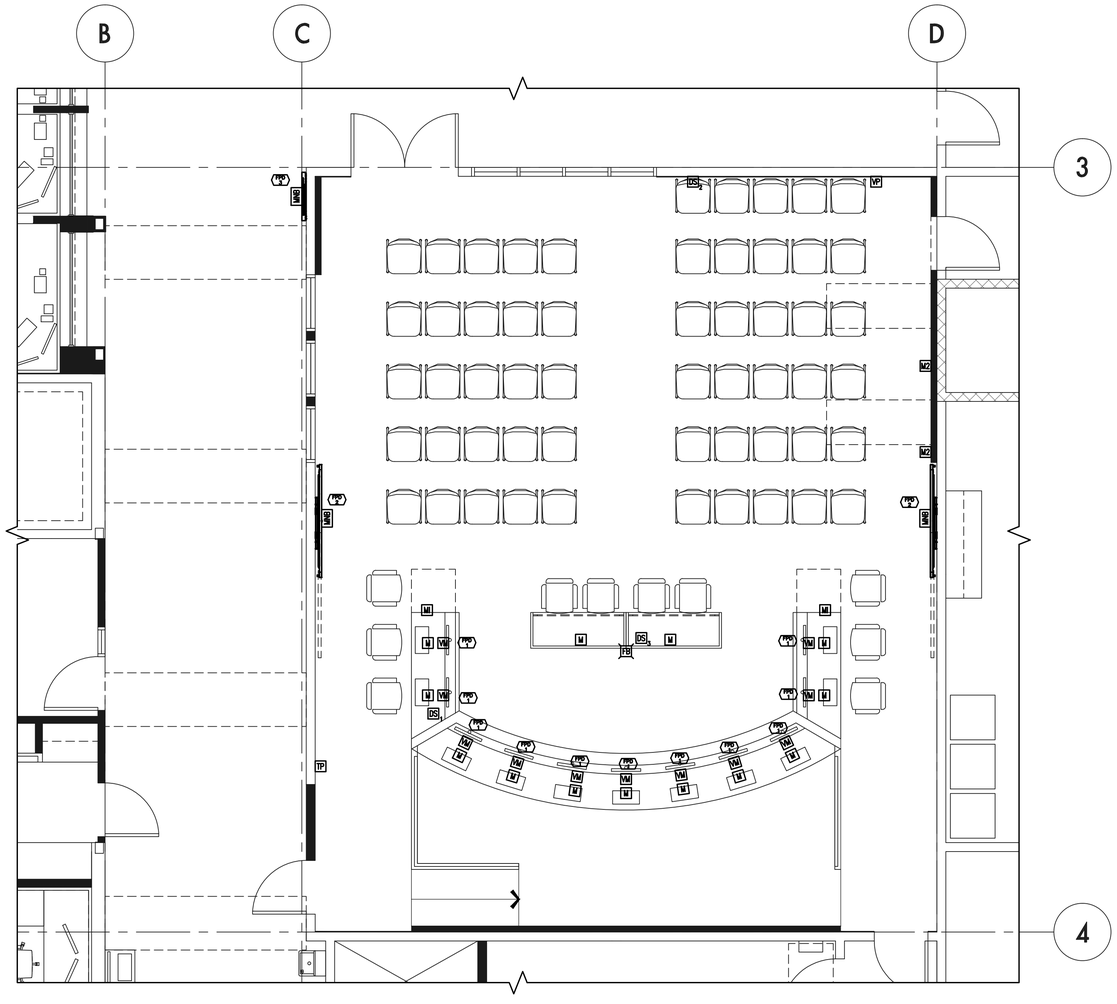
Issue	Revision	Date
100% CD		12/14/18

AUDIO/VIDEO SYSTEMS NOTES & SYMBOLS

Scale NONE
Date DECEMBER 14, 2018
Sheet No. TA001



1 MAIN FLOOR – COUNCIL CHAMBER AV LAYOUT
SCALE: 1/4" = 1' – 0"

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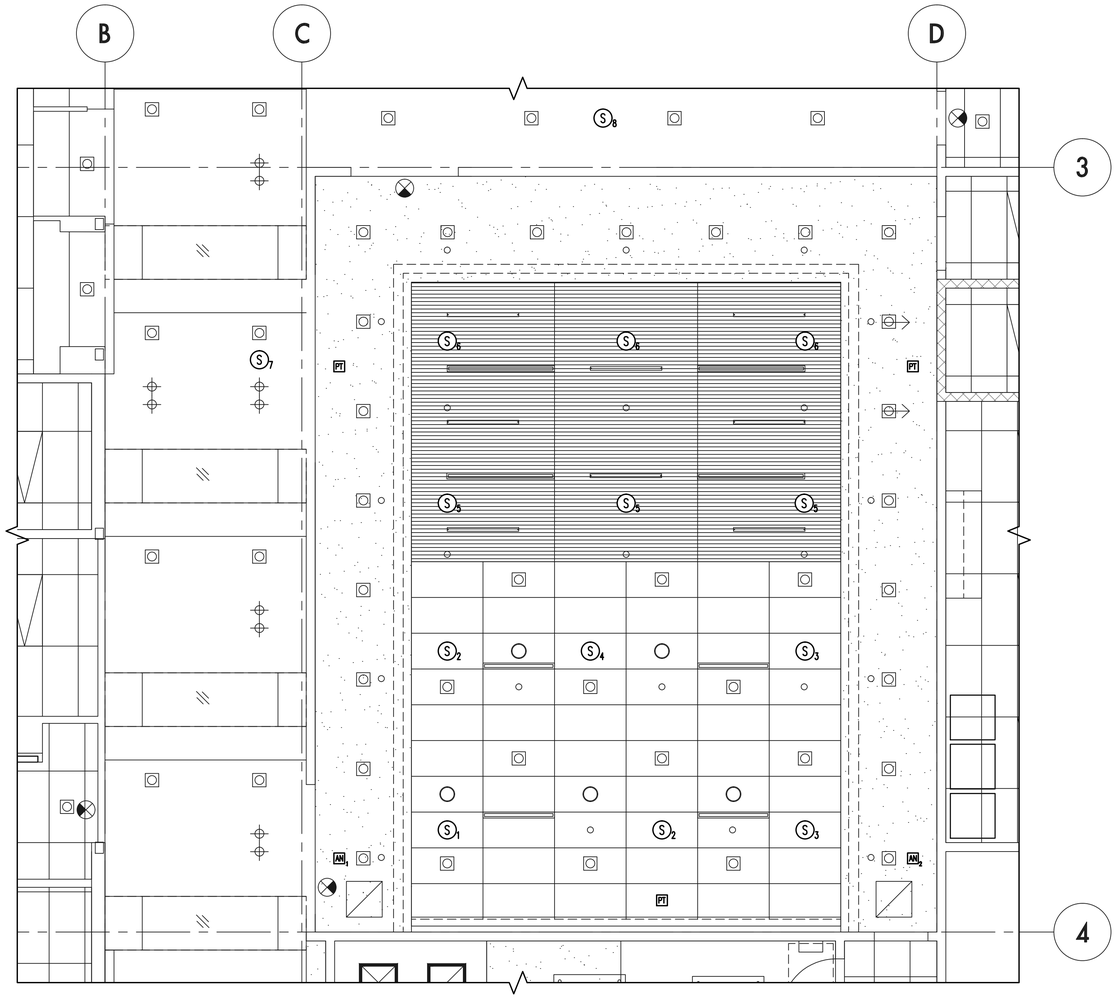
AUDIO/VIDEO SYSTEMS FLOOR PLAN LAYOUT

Scale NONE
Date DECEMBER 14, 2018
Sheet No. **TA101**



1 MAIN RCP – COUNCIL CHAMBER AV LAYOUT
SCALE: 1/4" = 1' – 0"

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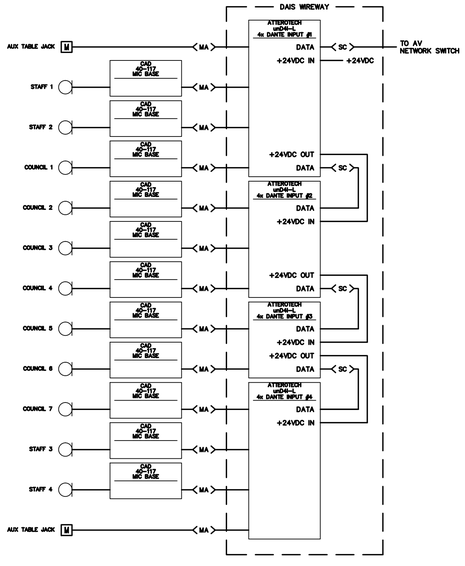
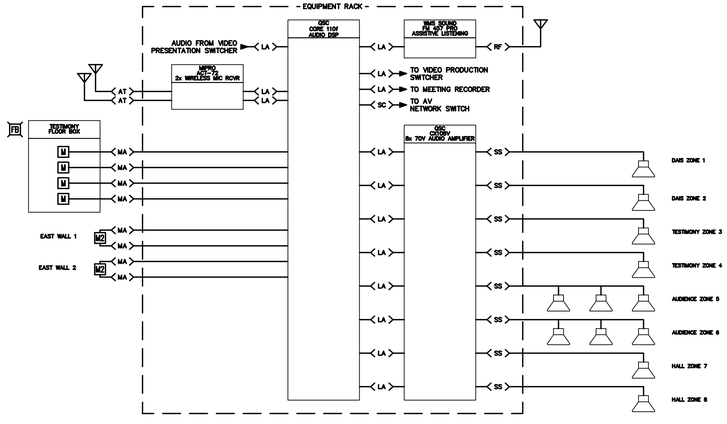
AUDIO/VIDEO SYSTEMS RCP LAYOUT

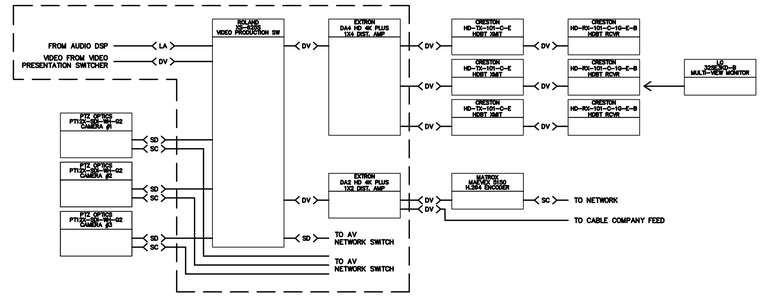
Scale	NONE
Date	DECEMBER 14, 2018
Sheet No.	TA201



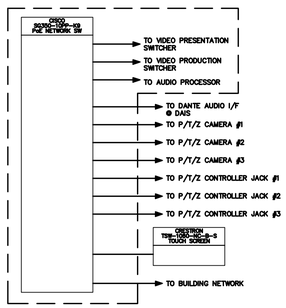
1 DAIS AUDIO
SCALE: NONE



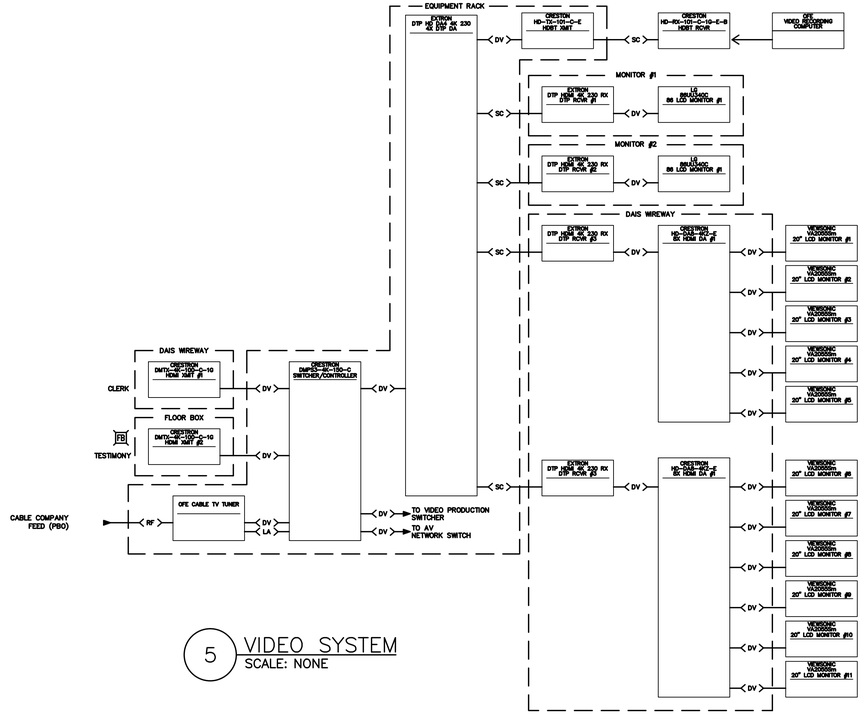
2 MAIN AUDIO SYSTEM
SCALE: NONE



3 PRODUCTION VIDEO SYSTEM
SCALE: NONE



4 AV NETWORK
SCALE: NONE



5 VIDEO SYSTEM
SCALE: NONE

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Issue	Revision	Date
100% CD		12/14/18

AUDIO/VIDEO SYSTEMS BLOCK DIAGRAMS

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PLACEHOLDER

Issue	Revision	Date
100% CD		12/14/18

AUDIO/VIDEO SYSTEMS DETAILS: PLATES & RACK ELEVATIONS

Scale	NONE
Date	DECEMBER 14, 2018
Sheet No.	TA501

PLACEHOLDER

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AUDIO/VIDEO SYSTEMS MOUNTING DETAILS

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Sheet No.	TA601