Architectural Preservation Studio, PC
Architecture, Historic Preservation, & Building Envelope Consulting

58 Pine Street, New Canaan, CT 06840
203.594.9735 / www.preservationstudio.com

SPECIFICATION FOR INTERIOR AND EXTERIOR RESTORATION
NEW LONDON CITY HALL
NEW LONDON, CT

CLIENT:

CITY OF NEW LONDON

ARCHITECT:

ARCHITECTURAL PRESERVATION STUDIO, PC
(APS)

PROJECT NO. **P15-050**

ISSUED: **November 1, 2016**

Specifications

For

New London City Hall

Interior and Exterior Restoration

New London, CT

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City of New London

Department of Finance-Purchasing Agent
13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

Invitation for Bids
Specifications and Proposal Documents Attached

Bid No.: **2017-07**

Opening Date and Time: **December 22, 2016 at 2:00 P.M.**

Title: **City Hall Restoration**

Special Instructions: There will be a **mandatory** pre-bid walk through site inspection at 10:30 A.M. on Wednesday, November 30, 2016. All interested parties are to meet at City Hall, 181 State Street, New London, CT. Late arrivals (more than fifteen (15) minutes after the scheduled start time) will not be given credit for attendance at the meeting and will not be able to submit a bid for this project.

The specifications & scope of work manual, and drawings will be posted as separate documents.

All Questions should be submitted in writing to the Purchasing Agent at asmith@ci.new-london.ct.us on later than December 8th.

The following information must appear in the lower left hand corner of the envelope:
Sealed Bid No.: 2017-07 City Hall Restoration
Not to be opened until December 22, 2016 at 2:00 P.M.

Return Bid to:

Alicia Smith, Purchasing Agent
City of New London
13 Masonic Street
New London, CT 06320

Bids shall not be accepted after the Opening Date and Time indicated above.

City of New London

Department of Finance-Purchasing Agent
13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

PLEASE RETURN THIS FORM IMMEDIATELY

Acknowledgement: Receipt of Invitation for Bids

Bid No.: 2017-07

City Hall Restoration **Due: December 22, 2016**

Please take a moment to acknowledge receipt of the attached documents. Your compliance with this request will help us to maintain proper follow-up procedures and will ensure that you receive any addendum that may be issued.

Date Issued: 11/18/2016

Date documents received: _____/_____/_____

Do you plan to submit a response? Yes_____ No_____

Print or type the following information:

Company Name: _____

Address: _____

_____

Telephone: _____ Fax: _____

E-mail: _____

Received by: _____

Note: Faxed or e-mailed acknowledgements are requested.
Fax No.: (860)447-5297
E-mail: asmith@ci.new-london.ct.us

Fax this sheet only. A cover sheet is not required.

City of New London

Department of Finance-Purchasing Agent
13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

Standard Invitation for Bids (IFB) and Contract Terms and Conditions

All Invitations for Bids issued by the City of New London (City) will bind Bidders to the terms and conditions listed below, unless specified otherwise in any individual Invitation for Bids.

Incorporated by reference into this contract are the provisions of Section 2-66 through 2-71 and Section 2-73 of the Code of Ordinances of the City of New London.

The contractor agrees to comply with the Code of Ordinances as they exist on the date of the contract and as they may be adopted or amended from time to time during the term of this contract and any amendments thereto.

Submission of Bids

1. Bids must be submitted on forms supplied by the City of New London. Telephone, facsimile or e-mail bids will not be accepted in response to an Invitation for Bids. An original and one (1) copy of the Proposal Form shall be returned to the Purchasing Agent.

2. The date and time bids are to be opened are given in each Invitation for Bids issued. Bids received after the specified date and time of the bid opening given in each Invitation for Bids will not be considered. Bid envelopes must clearly indicate the bid number as well as the date and time of the bid opening. The name and address of the bidder should appear in the upper left-hand corner of the envelope.

3. Incomplete proposal forms may result in the rejection of the bid Amendments to bids received by the Purchasing Agent after the date and time specified for the bid opening shall not be considered. Bids shall be computer prepared, typewritten or handwritten in ink. Bids submitted in pencil shall be rejected. A person duly authorized to sign bids for the bidder shall sign all bids. Unsigned bids shall be rejected. The person signing the Proposal Form or their authorized designee must initial errors, alterations or corrections on both the original and copy of the Proposal Form to be returned. In the event an authorized designee initials a correction, there must be written authorization from the person signing the Proposal Form to the person initialing the erasure, alterations or corrections. Failure to do so shall result in rejection of the bid for those items erased, altered or corrected and not initialed.

4. Conditional bids are subject to rejection in whole or in part. A conditional bid is defined as one that limits, modifies, expands or supplements any of the terms and conditions and/or specifications of the Invitation for Bids.

5. Alternate bids will not be considered. An alternate bid is defined as one that is submitted in addition to the bidder's primary response to the Invitation for Bids.

6. Prices should be extended in decimal, not fraction, to be net and shall include delivery and transportation charges fully prepaid by the Contractor to the destination specified in the Invitation for Bids and subject only to cash discount.

7. Pursuant to Sections 12-412 and 12-412(1) of the Connecticut General Statutes, the City of New London is exempt from the payment of excise, transportation and sales taxes imposed by the Federal Government and/or the State. Such taxes must not be included in the bid prices.

8. In the event of a discrepancy between the unit price and the extension, the unit price shall govern.

9. By its submission the Bidder represents that the bid is not made in connection with any other Bidder submitting a bid for the same commodity or commodities and is in all respects fair and without collusion or fraud.

10. All bids will be opened and read publicly and upon award are subject to public inspection.

Guaranty or Surety

11. Bid bonds, performance bonds, and labor and material bonds will be required as specified below. Guaranty or surety may be in the form of certified check. Bonds must meet the following requirements: Corporation – must be signed by an official of the corporation above their official title and the corporate seal must be affixed over the signature; Firm or Partnership - must be signed by all of the partners and indicate they are "doing business as"; Individual – must be signed by the owner and indicated as "Owner". The surety company executing the bond or countersigning must be licensed in Connecticut and an official of the surety company must sign the bond with the corporate seal affixed over the signature. Signatures of two (2) witnesses for both the principal and the surety must appear on the bond. Power of attorney for the official signing the bond for the surety company must be submitted with the bond.

    Bid Bond – Ten percent (10%) due at time of bid for all contract services and public works/construction projects that exceed twenty thousand dollars ($20,000.00)

    Performance Bond – One hundred percent (100%) of contract price for projects that exceed fifty thousand dollars ($50,000.00).

    Labor and Material Payment Bonds – One hundred percent (100%) of contract price for projects that exceed fifty thousand dollars ($50,000.00).

Award

12. Award of this contract will be made to the lowest responsible, qualified bidder and will be based on net cost and City specifications. The City of New London reserves the right to award this contract to other than the low bidder and to make multiple awards if deemed in the best interest of the City.

13. The contractor who is selected to perform this State project must comply with CONN. GEN. STAT. §§ 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5. An Affirmative Action Plan must be filed with and approved by the Commission on Human Rights and Opportunities prior to the commencement of construction.

    State Law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to subcontractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g, as amended. (25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The contractor must demonstrate good faith effort to meet the 25% set-aside goals.

    For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Form can be found at http:/www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806.

14. The City of New London allows a fifteen percent (15%) local vendor preference. A New London based business will be considered the lowest responsible bidder if its bid is within fifteen percent (15%) of the low bid and it is willing to accept the award at the low bid price. Any bidder claiming to be a New London based business must provide documentation that all of its motor vehicles are registered in New London and that payment of all of its property and motor vehicle taxes are current.

15. The City of New London may reject any bidder in default of any prior contract or guilty of misrepresentation or any bidder with a member of its firm in default or guilty of misrepresentation.

16. The Purchasing Agent may correct inaccurate awards resulting from clerical or administrative errors.

Standard Invitation for Bids (IFB) and Contract Terms and Conditions (con't)

Other Requirements

17. The City has an employment preference goal that jobs be offered to local residents on public prevailing wage projects with thresholds great than $100,000 for renovation and $400,000 for new construction. For such projects, it is understood that contractors shall make a good faith effort to employ a participating workforce comprised of twenty-five (25%) local residents of New London County, CT, with residents of the City of New London, CT getting a priority representing fifty percent (50%) of said participation, which will include twenty-five percent (25%) female and minority.

18. The City has an employee training preference goal that apprenticeship opportunities be made available for state licensed trades on public prevailing wage projects with thresholds greater than $100,000 for renovation and $400,000 for new construction. For such projects, it is understood that contractors shall make a good faith effort to employ a minimum of ten percent (10%) of the workforce per state licensed trade as apprentices and, of this number; a minimum of fifty percent (50) shall be in the first year of apprenticeship training.

Contract

19. The existence of a contract shall be determined in accordance with the requirements set forth above.

20. The Contractor shall not assign or otherwise dispose its contract or its right, title or interest, or its power to execute such contract to any other person, firm or corporation without the prior written consent of the City of New London.

21. Failure of a Contractor to deliver commodities or perform services as specified will constitute authority for the City of New London to purchase these commodities or services on the open market. The contractor agrees to promptly reimburse the City of New London for excess cost of these purchases. The purchases will be deducted from the contracted quantities.

22. The Contractor agrees to hold the City of New London harmless from liability of any kind for the use of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention furnished or used in the performance of the Contract; Guarantee its products against defective material or workmanship; repair damages of any kind, for which it is responsible to the premises or equipment, to its own work or to the work of other contractors; obtain and pay for all licenses, permits, fees etc., and to give all notices and comply with all requirements of the City of New London, the State of Connecticut and the U.S. Government.

23. Insurance requirements generally apply to contract services, professional services and public works improvement/construction projects. The Contractor will carry commercial general liability insurance to protect the City of New London from loss. The following minimum limits shall be met:

    Bodily Injury and Property Damage – One million dollars ($1,000,000.00) each occurrence; two million dollars ($2,000,000.00) aggregate

    Products or Completed Operations - One million dollars ($1,000,000.00) each occurrence; two million dollars ($2,000,000.00) aggregate

    Professional Liability (Errors and Omissions) Coverage appropriate to the contractor's operations – Two million dollars ($2,000,000.00) each occurrence

    Commercial Automobile Coverage including owned, non-owned, leased and hired vehicles (if used on City of New London property) – One million dollars ($1,000,000.00) combined single limit for each accident.

    Workers' Compensation Coverage - Will be in accordance with State of Connecticut requirements at the time of bid.

    Any deductible or self-insured retention must be disclosed and any claim payments falling within the deductible shall be the responsibility of the contractor.

The CITY requires that the aggregate limits be maintained by the CONTRACTOR as required. It is the responsibility of the CONTRACTOR or his representative to notify the CITY if ever or whenever claims reduce the General Aggregate below $1,000,000.

The Contractor shall require all subcontractors to carry the same forms and minimum coverages that it is required to provide. Evidence of these coverages must be provided to the City of New London Purchasing Agent prior to the contractor or subcontractor coming onto the work site.

All insurance policies shall be endorsed to the City of New London, its officers and employees as additional insured, and shall not be reduced or cancelled without thirty (30) days prior written notice to the Purchasing Agent. In addition, the contractor's insurance shall be primary as respects the City of New London, and any other insurance maintained by the City of New London shall be excess and not contributing insurance with the contractor's insurance.

24. Notwithstanding any provision or language in this contract to the contrary, the Mayor may, without cause, terminate this contract upon approval by the City Council, whenever he/she determines that such termination is in the best interest of the City of New London. Any such termination shall be effected by delivery to the Contractor of a written notice of termination. The notice of termination shall be sent by registered mail to the Contractor address furnished to the City of New London for purposes of correspondence or by hand delivery. Upon receipt of such notice, the Contractor shall both Immediately discontinue all services affected (unless the notice directs otherwise) and deliver to the City of New London all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the Contractor in performing its duties under this contract, whether completed or in progress. All such documents, information and materials shall become the property of the City of New London. In the event of such termination, the contractor shall be entitled to reasonable compensation as determined by the Mayor, however, no compensation for lost profits shall be allowed.

Delivery

25. All products and equipment delivered must be new unless otherwise stated in the proposal specifications.

26. All deliveries will be to the locations specified by the City of New London. The City of New London does not have a loading dock therefore all Contractors will be responsible for inside delivery without assistance from City of New London personnel.

27. Payment terms are net 45 days after receipt of goods or invoice, whichever is later, unless otherwise specified.

28. Charges against a Contractor shall be deducted from current obligations. Money paid to the City of New London shall be payable to the Treasurer, City of New London.

Saving Clause

29. The Contractor shall not be liable for losses or delays in the fulfillment of the terms of the contract due to wars, acts of public enemies, strikes, fires, floods, acts of God or any other acts not within the control of or reasonably prevented by the Contractor. The contractor will give written notice of the cause and probable duration of any such delay.

Advertising

30. Contractors may not reference sales to the City of New London for advertising and promotional purposes without prior approval of the City of New London.

Rights

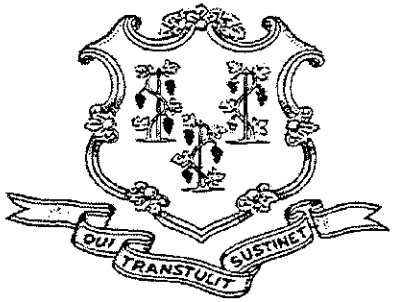
31. The City of New London has sole and exclusive right and title to all printed material produced for the City of New London and the Contractor shall not copyright the printed matter produced under this contract.

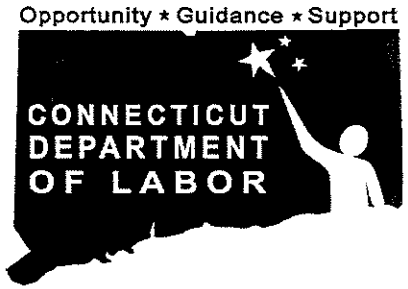
Standard Invitation for Bids (IFB) and Contract Terms and Conditions (con't)

32. The Contractor assigns to the City of New London all rights, title and interests in and to all causes of action it may have under Section 4 of the Clayton Act, 15 USC 15, or under Chapter 624 of the Connecticut General Statutes. This assignment occurs when the contractor is awarded the contract.

33. The Contractor agrees that it is in compliance with all applicable federal, state and local regulations, including but not limited to Connecticut General Statutes Section 7-148i. The Contractor also agrees that it will hold the City of New London harmless and indemnify the City of New London from any action which may arise out of any act by the Contractor concerning lack of compliance with these laws and regulations. All purchases will be in compliance with Sections 22a-194 to 22a-194g of the Connecticut General Statutes related to product packaging.

34. This contract is subject to the provisions of Executive Order Number Three of Governor Thomas J. Meskill promulgated June 16, 1971, the provision of Executive Order Number Seventeen of Governor Thomas J. Meskill promulgated February 15, 1973 and Section 16 of Public Act 91-58, nondiscrimination regarding sexual orientation, and the provisions of Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999 regarding Violence in the Workplace Prevention Policy.





THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

If you have QUESTIONS regarding your wages
CALL (860) 263-6790

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine
Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007*, where the total cost of all work to be performed is at least $100,000)

(1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);

(2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;

(3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least $100,000;

(4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;

(5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;

(6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;

(7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;

(8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;

(9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

(10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;

(11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;

(12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;

(13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;

(14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and

(15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.

(16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTMATELY ARISE CONCERNIG THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice

To All Mason Contractors and Interested Parties Regarding Construction Pursuant to Section 31-53 of the Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.

- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions,Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the ***contractor's*** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

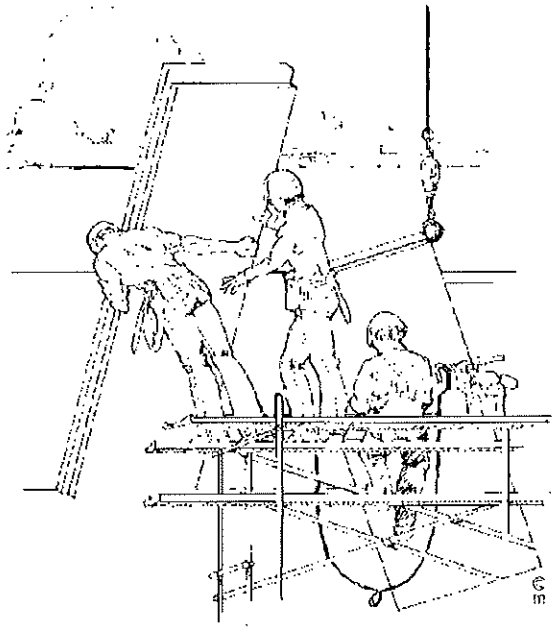
~NOTICE~

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached "Contracting Agency Certification Form" to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

✎ Inquiries can be directed to (860)263-6543.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION
CONTRACT COMPLIANCE UNIT

CONTRACTING AGENCY CERTIFICATION FORM

I, _____, acting in my official capacity as _____,
authorized representative — title

for _____, located at _____,
contracting agency — address

do hereby certify that the total dollar amount of work to be done in connection with

_____, located at _____,
project name and number — address

shall be $_____, which includes all work, regardless of whether such project

consists of one or more contracts.

CONTRACTOR INFORMATION

Name:_____

Address:_____
Authorized Representative:_____
Approximate Starting Date: _____

Approximate Completion Date:_____

_____ _____
Signature Date

Return To: Connecticut Department of Labor
Wage & Workplace Standards Division
Contract Compliance Unit
200 Folly Brook Blvd.
Wethersfield, CT 06109

Date Issued: _____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

Construction Manager at Risk/General Contractor/Prime Contractor

I,_____of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

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

_____
Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53
Certified Payrolls with a statement of compliance
shall be submitted monthly to the contracting agency.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Connecticut Department of Labor
Wage and Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

CONTRACTOR NAME AND ADDRESS:

SUBCONTRACTOR NAME & ADDRESS

WORKER'S COMPENSATION INSURANCE CARRIER

POLICY #

EFFECTIVE DATE:
EXPIRATION DATE:

PAYROLL NUMBER | Week-Ending Date | PROJECT NAME & ADDRESS

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION / Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE S	M	T	W	TH	F	S	Total ST Hours / Total O/T Hours	BASE HOURLY RATE / TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				HOURS WORKED EACH DAY																
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							

12/9/2013
WWS-CP1

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER _____OF

OSHA 10 ~ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

1) Medical or hospital care _____ 4) Disability_____

2) Pension or retirement _____ 5) Vacation, holiday_____

3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____of _____, (hereafter known as

Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

a) The records submitted are true and accurate;

b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;

c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);

d) Each such person is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;

e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and

f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such persons name first appears.

_____	_____	_____
(Signature)	(Title)	Submitted on (Date)

*****THIS IS A PUBLIC DOCUMENT*****
*****DO NOT INCLUDE SOCIAL SECURITY NUMBERS*****

Weekly Payroll Certification For
Public Works Projects (Continued)

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

Week-Ending Date:
Contractor or Subcontractor Business Name:

WEEKLY PAYROLL

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE S	M	T	W	TH	F	S	Total ST Hours Total O/T Hours	BASE HOURLY RATE TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				HOURS WORKED EACH DAY																
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							
												$ Base Rate	1. $ 2. $ 3. $							
												$ Cash Fringe	4. $ 5. $ 6. $							

*IF REQUIRED

12/9/2013
WWS-CP2

NOTICE: THIS PAGE MUST BE ACCOMPANIED BY A COVER PAGE (FORM # WWS-CP1)

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53
Certified Payrolls with a statement of compliance
shall be submitted monthly to the contracting agency.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Connecticut Department of Labor
Wage and Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

CONTRACTOR NAME AND ADDRESS:
Landon Corporation, 15 Connecticut Avenue, Northford, CT 06472

SUBCONTRACTOR NAME & ADDRESS
XYZ Corporation
2 Main Street
Yantic, CT 06389

WORKER'S COMPENSATION INSURANCE CARRIER
Travelers Insurance Company
POLICY # #BAC8888928
EFFECTIVE DATE: 1/1/09
EXPIRATION DATE: 12/31/09

PAYROLL NUMBER	Week-Ending Date	PROJECT NAME & ADDRESS
1	9/26/09	DOT 105-296, Route 82

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION / Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE S 20	M 21	T 22	W 23	TH 24	F 25	S 26	Total ST Hours / Total O/T Hours	BASE HOURLY RATE / TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				HOURS WORKED EACH DAY																
Robert Craft 81 Maple Street Willimantic, CT 06226		M/C	Electrical Lineman E-1 1234567 Owner OSHA 123456		8	8	8	8	8		S-TIME 40 O-TIME	$ 30.75 Base Rate $ 8.82 Cash Fringe	1. $ 5.60 2. $ 3. $ 2.01 4. $ 5. $ 6. $	$1,582.80				P-xxxx	$1,582.80	#123 $ xxx.xx
Ronald Jones 212 Elm Street Norwich, CT 06360	65%	M/B	Electrical Apprentice OSHA 234567		8	8	8	8	8		S-TIME 40 O-TIME	$ 19.99 Base Rate $ 16.63 Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $	$1,464.80	xx.xx	xxx.xx	xx.xx	G-xxx	$1,464.80	#124 $xxx.xx
Franklin T. Smith 234 Washington Rd. New London, CT 06320 SECTION B		M/H	Project Manager			8					S-TIME 8 O-TIME	$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $	$1,500.00	xx.xx	xx.xx	xx.xx	M-xx.x		#125 xxx.xx
											S-TIME O-TIME	$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							

7/13/2009
WWS-CP1

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER 1 OF 2

OSHA 10 ~ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

1) Medical or hospital care Blue Cross 4) Disability _____

2) Pension or retirement _____ 5) Vacation, holiday _____

3) Life Insurance Utopia 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of 9/26/09,

I, Robert Craft of XYZ Corporation, (hereafter known as Employer) in my capacity as Owner (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

a) The records submitted are true and accurate;

b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;

c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);

d) Each such employee of the Employer is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;

e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and

f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA--The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such employee's name first appears.

Robert Craft (Signature) owner (Title) 10/2/09 Submitted on (Date)

Section B: Applies to CONNDOT Projects ONLY

That pursuant to CONNDOT contract requirements for reporting purposes only, all employees listed under Section B who performed work on this project are not covered under the prevailing wage requirements defined in Connecticut General Statutes Section 31-53.

Robert Craft (Signature) owner (Title) 10/2/09 Submitted on (Date)

Note: CTDOL will assume all hours worked were performed under Section A unless clearly delineated as Section B WWS-CP1 as such. Should an employee perform work under both Section A and Section B, the hours worked and wages paid must be segregated for reporting purposes.

*****THIS IS A PUBLIC DOCUMENT*****

*****DO NOT INCLUDE SOCIAL SECURITY NUMBERS*****

OCCUPATIONAL CLASSIFICATION BULLETIN

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53.

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**
  - Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.
- **ASBESTOS INSULATOR**
  - Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.
- **BOILERMAKERS**
  - Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.
- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**
  - Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.
- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**
  - Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.
- **CLEANING LABORER**
  - The clean up of any construction debris and the general cleaning, including sweeping, wash down, mopping, wiping of the construction facility, washing, polishing, dusting, etc., prior to the issuance of a certificate of occupancy falls under the *Labor classification.*
- **DELIVERY PERSONNEL**
  - If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer/tradesman and not a delivery personnel.

- **ELECTRICIANS**
  - Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**
- **ELEVATOR CONSTRUCTORS**
  - Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ***License required by Connecticut General Statutes: R-1,2,5,6.**
- **FORK LIFT OPERATOR**
  - Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.
  - Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.
- **GLAZIERS**
  - Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce.
- **IRONWORKERS**
  - Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce. Insulated metal and insulated composite panels are still installed by the ironworker.
- **INSULATOR**
  - Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings. Past practice using the applicable licensed trades, Plumber, Sheet Metal, Sprinkler Fitter, and Electrician, is not inconsistent with the Insulator classification and would be permitted.
- **LABORERS**
  - Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.
- **PAINTERS**
  - Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hanging+ for any and all types of building and residential work.
- **LEAD PAINT REMOVAL**
  - Painter's Rate
    1. Removal of lead paint from bridges.
    2. Removal of lead paint as preparation of any surface to be repainted.
    3. Where removal is on a Demolition project prior to reconstruction.
  - Laborer's Rate
    1. Removal of lead paint from any surface NOT to be repainted.
    2. Where removal is on a *TOTAL* Demolition project only.
- **PLUMBERS AND PIPEFITTERS**
  - Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***
- **POWER EQUIPMENT OPERATORS**
  - ates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ***License required, crane operators only, per Connecticut General Statutes.**

- **ROOFERS**
  - Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (tear-off and/or removal of any type of roofing and/or clean-up of any and all areas where a roof is to be relaid)
- **SHEETMETAL WORKERS**
  - Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, facia, louvers, partitions, wall panel siding, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Insulated metal and insulated composite panels are still installed by the Iron Worker. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers.
- **SPRINKLER FITTERS**
  - Installation, alteration, maintenance and repair of fire protection sprinkler systems. ***License required per Connecticut General Statutes: F-1,2,3,4.**
- **TILE MARBLE AND TERRAZZO FINISHERS**
  - Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.
- **TRUCK DRIVERS**
  - **Definitions:**
    - 1) "Site of the work" (29 Code of Federal Regulations (CFR) 5.2(l)(b) is the physical place or places where the building or work called for in the contract will remain and any other site where a significant portion of the building or work is constructed, provided that such site is established specifically for the performance of the contact or project;
      - (a) Except as provided in paragraph (l) (3) of this section, job headquarters, tool yards, batch plants, borrow pits, etc. are part of the "site of the work"; provided they are dedicated exclusively, or nearly so, to the performance of the contract or project, and provided they are adjacent to "the site of work" as defined in paragraph (e)(1) of this section;
      - (b) Not included in the "site of the work" are permanent home offices, branch plant establishments, fabrication plants, tool yards etc, of a contractor or subcontractor whose location and continuance in operation are determined wholly without regard to a particular State or political subdivision contract or uncertain and indefinite periods of time involved of a few seconds or minutes duration and where the failure to count such time is due to consideration justified by industrial realities (29 CFR 785.47)
    - 2) "Engaged to wait" is waiting time that belongs to and is controlled by the employer which is an integral part of the job and is therefore compensable as hours worked. (29 CFR 785.15)
    - 3) "Waiting to be engaged" is waiting time that an employee can use effectively for their own purpose and is not compensable as hours worked. (29 CFR 785.16)
    - 4) "De Minimus" is a rule that recognizes that unsubstantial or insignificant periods of time which cannot as a practical administrative matter be precisely recorded for payroll purposes, may be disregarded. This rule applies only where there are uncertain and indefinite periods of time involved of a short duration and where the failure to count such time is due to consideration justified by worksite realities. For example, with respect to truck drivers on prevailing wage sites, this is typically less than 15 minutes at a time.
  - **Coverage of Truck Drivers on State or Political subdivision Prevailing Wage Projects**
    - Truck drivers **are covered** for payroll purposes under the following conditions:
      - Truck Drivers for time spent working on the site of the work.
      - Truck Drivers for time spent loading and/or unloading materials and supplies on the site of the work, if such time is not de minimus
      - Truck drivers transporting materials or supplies between a facility that is deemed part of the site of the work and the actual construction site.
      - Truck drivers transporting portions of the building or work between a site established specifically for the performance of the contract or project where a significant portion of such building or work is constructed and the physical places where the building or work outlined in the contract will remain.

      For example: Truck drivers delivering asphalt are covered under prevailing wage while" engaged to wait" on the site and when directly involved in the paving operation, provided the total time is not "de minimus"
    - Truck Drivers **are not** covered in the following instances:

- Material delivery truck drivers while off "the site of the work"
- Truck Drivers traveling between a prevailing wage job and a commercial supply facility while they are off the "site of the work"
- Truck drivers whose time spent on the "site of the work" is de minimus, such as under 15 minutes at a time, merely to drop off materials or supplies, including asphalt.

These guidelines are similar to U.S. Labor Department policies. The application of these guidelines may be subject to review based on factual considerations on a case by case basis.

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

Any questions regarding the proper classification should be directed to:

Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543

200 Folly Brook Boulevard, Wethersfield, CT 06109 / Phone: 860-263-6000
Home | CT.gov Home | Send Feedback
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Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

⇨ Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

BID FORMS

Your response should only include an original and one (1) copy (unless otherwise indicated in the specifications) of all documents after this page.

Do not use 3-ring binders!

City of New London

Department of Finance-Purchasing Agent
13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

Bid Proposal Form

Bid No.:	Bid Opening Date:	Bid Opening Time:	Bid Surety:	Date Issued:
2017-07	December 22, 2016	2:00 P.M.	10%	November 18, 2016

Project:
City Hall Restoration

REQUEST FOR PROPOSALS: Pursuant to the provisions of Section 2-69 of the Code of Ordinances of the City of New London, sealed proposals will be received by the Purchasing Agent for the City of New London, at the address above for furnishing the commodities and/or services herein listed.

IMPORTANT: Both pages of this form must be completed, signed and returned by the proposer as part of the proposal package.

NOTE: Proposer means Individual/Sole Proprietor, Partnership or Corporation name.

Section 1 of 3 – Proposer Information

Complete Company Name (Trade Name, Doing Business As)				SSN or FEIN
Company Address	Street	City	State	Zip Code
Contact Name (Typed or Printed)	Telephone Number (Include Toll-Free Numbers)			FAX Number
Written Signature of Person Authorized to Sign Proposals on Behalf of the Above Named Company ⟸ **SIGN HERE**				Date Executed
Type or Print Name of Authorized Person		Title of Authorized Person		
Company's E-Mail Address		Company's Web Site		

Is Your Business a: ☐ Proprietorship (Individual), ☐ Partnership or ☐ Corporation ? (Type of Corporation -)

Is Your Business **Currently** a State of Connecticut Certified Small Business? ☐ Yes (Attach Certificate Copy to Bid) ☐ No

If your business is a **Partnership,** you must attach the names and titles of all partners to this bid when returned.

If your business is a **Corporation,** in which State are you incorporated?

Is your business reportable to the IRS? ☐ Yes ☐ No If yes, a 1099/W2 will be mailed to you at year end.

Remittance Information: In this box indicate the Remittance Address of your business if different from above.

City of New London

Department of Finance-Purchasing Agent
13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

Bid Proposal Form

Section 2 of 3 Important Information for Proposers

AFFIRMATION OF PROPOSER: The undersigned proposer affirms and declares:

1. That this proposal is executed and signed by said bidder with full knowledge and acceptance of the provisions of the Standard Proposal and Contract Terms and Conditions of current issue and in effect on the date of bid issue. These Standard Proposal and Contract Terms and Conditions are made a part of the contract.

2. That should any part of this proposal be accepted in writing by the City of New London within thirty (30) days from the date of proposal opening unless and earlier for acceptance is specified by the proposer the proposal schedule, said proposer will furnish and deliver the commodities and/or services for which this proposal is made, in the quantities and at the prices proposed, and in compliance with the provisions of the STANDARD PROPOSAL AND CONTRACT TERMS AND CONDITIONS, COMMODITY SPECIFICATIONS,PROPOSAL SCHEDLE AND SPECIAL PROPOSAL AND CONTRACT TERMS AND CONDITIONS. Should award of any part of this proposal be delayed beyond the period of thirty (30) days or an earlier date specified by the proposer in the proposal schedule, such award shall be conditioned on the proposer's acceptance.

3. Acceptance of the conditions set forth herein, agreement in strict accordance therewith, and will furnish and deliver the commodities and/or services to the City of New London at the prices bid therein.

4. Should the Purchasing Agent determine that the proposer has not completed Section 1 – Proposer Debarment and/or Suspension included as part of this document, then such determination may be just cause for disqualification from the evaluation of this proposal.

Section 3 of 3 – Proposer Debarment and/or Suspension

Has the bidder, any company officials, or any subcontractor to the bidder, any of its company officials received any notices of debarment and/or suspension from contracting with the State of Connecticut, the federal government, any other state within the United States, any of its territories or any governmental entity?

☐ Yes ☐ No

If the above signed bidder, any company official or any subcontractor to the bidder **has** received notice of debarment and/or suspension from contracting with the State of Connecticut, the federal government or any governmental entity, said notices must be attached to this document when submitting this bid.

Number of notices attached _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____

_____

as Principal, and _____

a corporation duly organized under the laws of the State of _____as Surety are held and firmly bound unto the **City of New London, 181 State Street, New London, CT 06320,** hereinafter called the "Owner" in the sum of _____Dollars ($_____), for the payment of which sum well and truly to be made, the said Principal and Surety, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid dated _____ to

NOW THEREFORE, if the Owner shall accept the bid of the Principal and the Principal shall enter into a Contract with the Owner in accordance with the terms of such bid and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Owner the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____ 200.

_____
(Principal) (Seal)

_____ _____
(Witness) (Title)

_____
(Surety) (Seal)

_____ _____
(Witness) (Title)

Attorney-in-Fact, State of _____, Power-of-Attorney for person signing for Surety Company must be attached to Bond.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____ certify that I am the _____ _____, of the Corporation named as Principal in the within bond; that _____ _____ who signed the said bond on behalf of the Principal was then the _____ _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of this governing body.

Affix
_____ Corporate
Seal

Title _____

NON COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____)
) ss.
County of _____)

_____, being first duly sworn, deposes and say that:

(1) He is _____ of _____ herein referred to as the "Bidder" that has submitted the attached bid;

(2) He is fully informed respecting the preparation and content of the attached Bid and of all pertinent circumstances respecting such Bid;

(3) Such Bid is genuine and is not a collusive or sham Bid;

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of New London, CT or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties of interest, including this affiant.

(6) That no officer or employee or person whose salary is payable in whole or in part from the City of New London is directly or indirectly interested in this Bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.

Signed _____

Title _____

Subscribed and sworn before me this

_____ day of _____ 20____

_____
(Notary Public)

My Commission expires _____

NON COLLUSION AFFIDAVIT OF SUBCONTRACTOR

State of _____)
) ss.
County of _____)

_____, being first duly sworn, deposes and says that:

(1) He is _____ of _____ herein referred to as the "Subcontractor";

(2) He is fully informed respecting the preparation and content of the Subcontractor's Proposal submitted by the Subcontractor to _____, the Contractor for certain work in connection with the _____ Contract pertaining to the Project in New London, Connecticut;

(3) Such Subcontractor's Proposal is genuine and is not a collusive or sham Bid;

(4) Neither the said Subcontractors nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in said Subcontractor's Proposal or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of New London, CT or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Subcontractor's Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties of interest, including this affiant.

(6) That no officer or employee or person whose salary is payable in whole or in part from the City of New London is directly or indirectly interested in this Bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.

Signed _____

Title _____

Subscribed and sworn before me this

_____ day of _____ 20____

_____
(Notary Public)

My Commission expires _____

Statement of Bidder's Qualifications

All items and questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The bidder may submit any additional information it desires.

1. Name of Bidder _____

2. Bidder's Tax Identification No. _____

3. Permanent main office address _____

_____

4. When organized _____

5. If corporation, where incorporated _____

6. Number of years have you been engaged in the contracting business under your present firm or trade name

_____

7. Contracts on hand: (Schedule these showing amount of each contract and the appropriate anticipated dates of completion) _____

_____

8. General character of work performed by your company _____

_____

9. Have you ever failed to complete any work awarded to you? If so, where and why? _____

_____

10. Have you ever defaulted on a contract? If so, where and why? _____

_____

11. List the more important projects recently completed by your company, stating the approximate cost for each, and the month and year completed (use a separate sheet if necessary)_____

_____

12. List your major equipment available for this Contract _____

_____

13. List your experience in work similar to this project _____

_____

14. List the background and experience of the principal members of your organization, including officers ____

_____

_____

15. List the work to be done by Subcontractors and summarize the dollar value of each Subcontract

_____

16. Credit available $_____

17. Give Bank reference _____

18. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Owner? _____

_____

19. The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated _____ _____
(Name of Bidder)

By _____

Title _____

State of _____)
) ss.
County of _____)

_____ being duly sworn deposes and says that (s)he is _____

_____ of _____

_____, and that the answers to the foregoing items and questions and all statements therein contained are true and correct.

Subscribed and sworn to before me this

_____ day of _____ 20

_____
(Notary Public)

My Commission expires _____

AFFIRMATIVE ACTION POLICY STATEMENT

(must be submitted on your firm's letterhead)

It has always been the policy and will continue to be the strong commitment of _____ _____ and all contractors and subcontractors who do business with this City to provide equal opportunities in employment to all qualified persons solely on the basis of job-related skills, ability and merit. _____will continue to take Affirmative Action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, national origin, ancestry, mental disorder (present or past history thereof), age, physical disability (but not limited to blindness), marital status, mental retardation, and criminal record. Such action includes, but is not limited to, employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation and selection for training including apprenticeship._____ _____, and its subcontractors will continue to make good faith efforts to comply with all federal and state laws and policies which speak to equal employment opportunity.

The principles of Affirmative Action are addressed in the 13th, 14th, and 15th Amendments of the United States Constitution, Civil Rights Act of 1866, 1870, 1871, Equal Pay Act of 1963, Title VI and VII of - the 1964 United States Civil Rights Act, Presidential Executive Orders 11246, amended by 11375, (nondiscrimination under federal contracts), Act I, Sections 1 and 20 of the Connecticut Constitution, Governor Grasso's Executive Order Number 11, Governor O'Neill's Executive Order Number 9, the Connecticut Fair Employment Practices Law (Sec. 46a-60-69) of the Connecticut General Statutes, Connecticut Code of Fair Practices (46a-70-81), Deprivation of Civil Rights (46a-58(a)(d)), Public Accommodations Law (46a-63-64), Discrimination against Criminal Offenders (46a-80), definition of Blind (46a-51(1)), definition of Physically Disabled (46a-51(15)), definition. of Mentally Retarded (46a-51(13)), cooperation with the Commission on Human Rights and Opportunities (46 - 77), Sexual Harassment (46a-60(a)-8), Connecticut Credit Discrimination Law (36-436 through 439), Title I of the State and Local Fiscal Assistance Act of 1972.

This Affirmative Action Policy Statement re-affirms my personal commitment to the principles of Equal Employment Opportunity.

_____ _____

DATE Signature of Authorized Signer

CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246 Part II, Section 203(b), (30 FR 12319, 12935). The implementing rules and regulations provide that any bidder or prospective contractor, or any of its proposed subcontractors, shall state whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicated that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven (7) calendar days after bid opening. No contract shall be awarded unless such report is submitted.

CERTIFICATION BY BIDDER

Bidder's Name _____

Address and Zip Code _____

_____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause.

   Yes ( ) No ( ) If answer is yes, identify the most recent contract.

2. Compliance reports were required to be filed in connection with such contract or subcontract
   Yes ( ) No ( ) If answer is yes, identify the most recent contract.

3. Bidder has filed all compliance reports due under applicable instructions, including SF. 100.
   Yes ( ) No ( ) Not Required ( )

4. If answer to Item 3 is "No" please explain in detail on reverse side of this Certification.

Certification - The information above is true and complete to the best of my knowledge and belief. A willfully false statement is punishable by law (U.S. Code, Title 18, Section 1001).

_____
Name and Title of Signer (Please Type)

_____ _____
Signature Date

CERTIFICATION OF NON-SEGREGATED FACILITIES

This Bidder certifies that he does not maintain or provide his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The Bidder certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any locations, under his control, where segregated facilities are maintained. The Bidder agrees that a breach of his certification will be a violation of the Equal Opportunity clause and any Contract resulting from acceptance of this Bid. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, color, religion or national origin, because of habit, local custom or otherwise. The Bidder agrees that (except where he has obtained identical certification from proposed Subcontractors for specific time periods) he will obtain identical certifications from proposed Subcontractors prior to the award of Subcontracts exceeding $10,000 which are not exempt form the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have already submitted identical certifications for the specific time periods):

> "Notice to prospective subcontractors of requirements for non-segregated facilities. A certification of non-segregated facilities must be submitted prior to the award of a subcontract exceeding the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e. quarterly, semi-annually, or annually).

Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. Paragraph 1001.

Date: _____ By: _____

Official Address: _____ Title: _____

_____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto _____ as Obligee, hereinafter called Owner, in the amount of _____ _____ Dollars ($_____), for payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contract has by written agreement dated _____ entered into a Contract

with Owner for _____

_____

_____

which Contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, the condition of this obligation is such that, if Contractor shall promptly and faithfully perform said Contract, including such remedial work as may be required under the guaranty during the period of guaranty and shall certify in writing that all wages paid under said Contract to any mechanic, laborer or workman were equal to the rates or wages customary or then prevailing for the same trade or occupation in Connecticut, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Owner.

Whenever Contractor shall he, and declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default or shall promptly:

(1) Complete the Contract in accordance with its terms and conditions, by another Contractor acceptable to the Owner, said other Contractor to act as an agent for the Surety, or

(2) Obtain a Bid or Bids for submission to the Owner for completing the Contract in accordance with its terms and conditions, and upon determination by the Owner and Surety of the lowest responsible Bidder, arrange for a Contract as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price, but not exceeding, including, other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The terms "balance of the contract price" , as used in this paragraph, shall mean the total amount payable by the Owner to the Contractor under the Contract and any amendments thereto, less the amount properly paid by the Owner to the Contractor.

Unless otherwise required by law, any suit under this Bond must be instituted before the expiration of one (1) year from the date on which the guaranty period under the Contract expires.

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

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument under their several seals this _____ _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and these presents signed by its undersigned representative, pursuant to authority of its governing body.

No extension of time or other modification of this Bid Bond shall be valid unless agreed in writing by the parties to this Bond.

_____
(Corporate Principal)

_____

Attest: _____
(Business Address)

_____ By _____ Affix Corporate Seal

_____
(Corporate Surety)

_____

Attest: _____
(Business Address)

_____ By _____ Affix Corporate Seal

Countersigned
by _____

Attorney-in-Fact, State of _____, Power-of- Attorney for person signing for Surety Company must be attached to Bond.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____ certify that I am the _____ _____, of the Corporation named as Principal in the within bond; that _____ _____ who signed the said bond on behalf of the Principal was then the _____ _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of this governing body.

_____ Affix Corporate Seal

Title _____

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____, as Principal

(hereinafter called Principal) and _____

as Surety, (hereinafter called Surety) are held and firmly bound unto _____

_____ as Obligee (hereinafter called Owner), for the use and benefit of claimants as hereinbelow defined;
in the amount of _____
Dollars ($_____) for the payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____ entered into a Contract with the owner for _____

_____

_____

which Contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, the condition of this obligation is such that, if the said Principal shall promptly pay for all materials furnished and labor supplied or performed in the prosecution of the work included in and under the aforesaid Contract, whether or not the material or labor enters into and becomes a component part of the real asset, then this obligation shall be null and void otherwise it shall remain in full force and effect.

PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to be done under it, or the giving by the Owner or any other forbearance on the part of either the Owner or the Principal to the other shall not in any way release the Principal and the Surety or either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety for any such alterations, extension or forbearance being hereby waived.

Any party, whether a subcontractor or otherwise, who furnished materials or supplies or performs labor or services in the prosecution of the work under said Contract, and who is not paid therefore, may bring a suit on this Bond in the name of the person suing, prosecute the same to a final judgment and have the execution thereon for such sum as may be justly due.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument under their several seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and these presents signed by its undersigned representative, pursuant to authority of its governing body.

_____
(Corporate Principal)

_____

Attest:
_____

_____
(Business Address)

Affix

_____ By _____
Corporate
Seal

_____
(Corporate Surety)

_____

Attest:
_____

_____
(Business Address)

Affix

_____ By _____
Corporate
Seal

Countersigned
by _____

Attorney-in-Fact, State of _____, Power-of- Attorney for person signing for Surety Company must be attached to Bond.

CONTRACT FORMS

CONTRACT FOR SERVICES

THIS AGREEMENT made and entered into this __ day of _____, by and between *(contractor legal name and address)*, hereinafter called **"Contractor"** and the City of New London, 181 State Street, New London, CT 06320, hereinafter called **"City."**

WHEREAS, the City desires to enter into a contract for services to *(description* of work), and the Contractor represents itself as competent and qualified to accomplish the specific requirements of this contract to the satisfaction of the City, therefore this contract is entered into under the following terms and conditions:

1. The Contractor agrees to perform the services described below in the Contract Documents or in attachments if applicable. The terms and conditions as contained in this Contract for Services shall take precedence over any conflicting terms as may be attached hereto.

2. Term of the Contract: The start date for this Contract shall be *(date work starts)* and the completion date of this Contract shall be *(date)*.

3. Contract Price: The City shall pay the Contractor for the performance of the Contract in current funds, for the total quantities of work performed for the price of *(written and numeric dollar value)*. A 5% retainage will be deducted from each payment invoice submitted by the contractor and the total retained will be released after one (1) full year from the date the project was completed and accepted by the City of New London.

4. Contract Documents: The Contract Documents consist of this Agreement, the Standard Bid and Contract Terms and Conditions, the Instructions to Bidders, the Contractor's bid as accepted by the City, the General and Special Conditions of the Work, the Technical Specifications, the drawings and all Addenda attached hereto.

The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of this Agreement and the provisions of any of the other Contract Documents, the provisions of the Agreement shall prevail.

Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the edition of the standard specification, manual, code or laws or regulations identified in the reference. In the event a particular edition is not identified, the reference shall mean the latest edition in effect at the time of receipt of the bid. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the City, the Contractor or any of their consultants, agents or employees from those set forth in the Contract Documents.

5. Obligations And Liability Of The Contractor: The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the Work in the manner and within the time hereinafter specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the City, and at the prices herein agreed upon therefor.

All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the Work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation, whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.

The Contractor shall coordinate his operations with those of any other contractors who may be employed on other work of the City, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precaution as may be necessary to protect life and property.

The Contractor shall indemnify and save harmless the City and its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due to or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, the City or any of their respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the City, its officers, agents, servants, or employees, against any such damages occasioned solely by acts or omissions of the owner other than supervisory acts or omissions of the City in the Work.

The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by any right of the City to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the City to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes.

The Contractor shall conduct his operations so as not to damage existing structures or work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as new the damaged portions at his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.

The Contractor shall be as fully responsible to the City for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.

Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor of any such other contractor, the Contractor shall have no claim against the City therefor, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.

If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage.

The Contractor agrees to and does hereby indemnify and save harmless the City from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay and from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, arising out of, relating to or resulting from such claims.

The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him in connection with the Work or his operations under this Agreement and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work.

6. Supervision Of Work: The Contractor shall be solely responsible for supervision of the Work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the City, its officers, agents or employees in every possible way.

At all times, the Contractor shall have as his agent on the Work a competent superintendent capable of reading and thoroughly understanding the Drawings and Specifications, with full authority to execute the directions of the Engineer without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools,

supplies and other items as may be required. Such superintendent shall not be removed from the Work without the prior written consent of the City. If, in the opinion of the City, the superintendent or any successor proves incompetent, the Contractor shall replace him with another person approved by the City; such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the Work.

Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such work, such directions or instructions may be given by the City to and shall be received and obeyed by the foreman or any other person in charge of the particular work involved.

7. Insurance: The Contractor shall procure and maintain insurance of the types specified below, and to the limits for this insurance specified in the Standard Bid and Contract Terms and Conditions and the City of New London Code of Ordinances, Article IV., Section 2-71. All insurance shall be obtained from companies satisfactory to the City.

Insurance shall be in such forms as will protect the Contractor from all claims and liability for damages for bodily and personal injury, including accidental death, and for property damage, which may arise from operations under the Contract, whether such operations be by himself, his subcontractors, or by anyone directly or indirectly employed or engaged by him.

The following types of insurance shall be provided before starting and until final completion and acceptance of the Work and expiration of the guarantee period provided for in the Agreement.

a. Workmen's Compensation and Employer's Liability Insurance.

b. Bodily Injury Insurance for operations and completed operations and Contractor's Protective Bodily Injury Insurance.

c. Property Damage Insurance for operations and completed operations and Contractor's Protective Property Damage Insurance, each including coverage for injury to or destruction of wires or pipes and similar property and appurtenant apparatus and the collapse of or structural injury to any building or structure except those on which work under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting under the Contract, and no blasting shall be performed until such insurance has been secured.

d. Bodily Injury Insurance covering the operation of all motor vehicles owned by the Contractor.

e. Personal Injury Insurance to cover claims for personal injury and including claims brought by employees.

f. Property Damage Insurance covering the operation of all motor vehicles owned by the Contractor.

g. Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, while such vehicles are being operated in connection with the prosecution of the Work.

h. Contractual Liability Insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and Liability of Contractor" of this Agreement.

i. Owner's Protective Liability and Property Damage Insurance to protect the City and any Engineer against claims for Property damage and for bodily injuries, including accidental death, caused by the operations of the Contractor or his subcontractors on the Work. The policy shall indicate the City and any Engineer as the named insured. A copy of the policy shall be furnished to the City and a Certificate of Insurance shall be furnished to any Engineer.

Any of the above coverages written on a claims made form have an Extended Reporting Period of three years from the termination of the contract.

All policies shall be so written that the owner will be notified in writing of cancellation or restrictive amendment at least 30 days prior to the effective date of such cancellation or amendment.

Certificates from the Contractor's insurance carriers stating the coverages provided, the limits of liability, and expiration dates shall be filed in triplicate with the Engineer before operations are begun. Such certificates shall be on the form furnished by the Engineer.

The CITY requires that the aggregate limits be maintained by the CONTRACTOR as required. It is the responsibility of the CONTRACTOR or his representative to notify the CITY if ever or whenever claims reduce the General Aggregate below $1,000,000.

Renewal certificates must be furnished by the Contractor prior to the expiration date of any of the initial insurances.

No insurance required or furnished hereunder shall in any way relieve the Contractor of or diminish any of his responsibilities, obligations and liabilities under the Contract.

8. Contract: This Agreement, which includes all the Contract Document elements listed in paragraph 1 above, forms the Contract between the parties identified in the heading of this document. In the event that any provision of the Contract conflicts with any other provision of this Contract, the decision of the City will be final.

9. Funding and Fiscal Year Appropriations: Appropriations for expenditures by the City and authorization to spend for a particular purpose are ordinarily made on a fiscal year basis. The fiscal year of the City is the twelve (12) month period ending June 30 of each year. The obligations of the City under this Contract for the present or any subsequent fiscal year following the fiscal year in which this Contract is executed are subject to the appropriation of funds sufficient to discharge the City's obligation, which accrues in this or any subsequent fiscal year. In the absence of such appropriation or authorization, this Contract shall be terminated immediately upon the Contractor's receipt of notice to said effect without liability for damages, penalties or other charges arising from early termination. Expenditures for Contracted services that will extend beyond a single fiscal year shall not exceed in any fiscal year the amount appropriated and authorized for said fiscal year. The Contractor's yearly costs, as contained herein, may not exceed the amount appropriated for said year.

10. Termination: The Contract may be terminated without cause by either party by giving written notice to the other at least thirty (30) calendar days prior to the effective date of termination stated in the notice. If Contractor fails to fulfill his obligations, the City may terminate this Contract by giving written notice to the Contractor at least seven (7) calendar days before the effective date of termination stated in the notice. The notice shall state the circumstances of the alleged breach and may state a period during which the alleged breach may be cured, which cure shall be subject to approval by the City.

11. Obligations in Event of Termination:

A. Upon termination, all finished or unfinished documents, data, studies, and reports prepared by the Contractor pursuant to this Contract, shall become the property of the City.

B. The City shall promptly pay the Contractor for all services performed to the effective date of termination, subject to indemnification provisions of Paragraph 5 hereof and subject to offset of sums due the Contractor against sums owed by the Contractor to the City.

12. Record keeping, Audit, and Inspection of Records: The Contractor shall maintain books, records and other compilations of data pertaining to the requirements of the Contract to the extent and in such detail as shall properly substantiate claims for payment under the Contract. All such records shall be kept for a period of six (6) years or for such longer period as is specified herein. All retention periods start on the first day after final payment under this Contract. If any litigation, claim, negotiation, audit or other action involving the records is commenced prior to the expiration of the applicable retention period, all records shall be retained until completion of the action and resolution of all issues resulting therefrom, or until the end of the applicable retention period, whichever is later. The Federal grantor agency, the State Auditor, the City, or any of their duly authorized representatives or designees shall have the right at reasonable times and upon reasonable notice, to examine and copy, at reasonable expense, the books, records, and other compilations of data of the Contractor which pertain to the provisions and requirements of this Contract. Such access shall include on-site audits, review, and copying of records.

13. Publicity, Publication, Reproduction and Use of Contract Products or Materials: Unless provided otherwise by law or the City, title and possession of all data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for with City funds shall vest with the City at the termination of the Contract. The Contractor shall at all times obtain the prior written approval of the City before it, any of its officers, agents, employees or subcontractors, either during or after termination of the Contract, makes any statement bearing on the work performed or data collected under this Contract to the press or issues any material for publication through any medium of communication. If the Contractor, or any of its subcontractors, publishes a work dealing with any aspect of performance under the Contract, or of the results and accomplishments attained in such performance, the City shall have a royalty-free

non-exclusive and irrevocable license to reproduce, publish or otherwise use and to authorize others to use the publication. The Contractor shall use reasonable means to inform the public that the City provides financial support for its operations and services by explicitly stating on publicity material, stationery, posters and other written materials, and on its premises the following: "This program is supported in part (in full) by the City of New London."

14. Assignment by Contractor and Subcontracting: The Contractor shall not assign or in any way transfer any interest in this Contract without the prior written consent of the City, nor shall he subcontract any services without the prior written approval of the City.

15. Connecticut Law: It is agreed that this contract shall be governed by, construed, and enforced in accordance with the internal laws of the State of Connecticut.

16. Venue: In the event of litigation, the parties do agree to be contractually bound to submit themselves to the personal jurisdiction of the state courts of Connecticut. The venue for any court proceeding shall be in the Superior Court for the Judicial District for New London at New London, Connecticut.

17. Waiver of Jury Trial: CONTRACTOR HEREBY EXPRESSLY WAIVES ANY AND ALL RIGHTS IT MAY HAVE TO TRIAL BY JURY OF ANY CLAIM, DEMAND, ACTION OR CAUSE OF ACTION (1) ARISING UNDER THIS AGREEMENT OR ANY OTHER INSTRUMENT, DOCUMENT OR AGREEMENT EXECUTED OR DELIVERED IN CONNECTION HEREWITH, OR (2) IN ANY WAY CONNECTED WITH OR RELATED OR INCIDENTAL TO THE DEALINGS OF THE PARTIES HERETO OR ANY OF THEM WITH RESPECT TO THIS AGREEMENT OR ANY OTHER INSTRUMENT, DOCUMENT OR AGREEMENT EXECUTED OR DELIVERED IN CONNECTION HEREWITH, OR THE TRANSACTIONS RELATED HERETO OR THERETO, IN EACH CASE WHETHER NOW EXISTING OR HEREAFTER ARISING, AND WHETHER SOUNDING IN CONTRACT OR TORT OR OTHERWISE; AND CONTRACTOR HEREBY AGREES AND CONSENTS THAT ANY SUCH CLAIM, DEMAND, ACTION OR CAUSE OF ACTION SHALL BE DECIDED BY COURT TRIAL WITHOUT A JURY, AND THE CITY MAY FILE AN ORIGINAL COUNTERPART OR A COPY OF THIS SECTION WITH ANY COURT AS WRITTEN EVIDENCE OF CONTRACTOR'S CONSENT TO THE WAIVER OF ITS RIGHT TO TRIAL BY JURY.

18. Nondiscrimination and affirmative action provisions, nondiscrimination provisions regarding sexual orientation, Executive Order Number Three and guidelines and rules, Executive Order Number Seventeen, Executive Order Number Sixteen and sexual harassment policy:

For the purposes of this article, the word "contractor" is substituted for and has the same meaning and effect as if it read "Contractor's name." Section A of this article is inserted in connection with subsection (a) of Section 4a-60 of the General Statutes of Connecticut, as revised. Section B of this article is inserted in connection with subsection (a) of Section 4a-60a of the General Statutes of Connecticut, as revised.

A. (a) For the purposes of this section, "minority business enterprise" means any small contractor or supplier of materials fifty-one percent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of Conn. Gen. Stat. Section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements.

For the purposes of this section, "Commission" means the Commission on Human Rights and Opportunities.

For the purposes of this section, "public works contract" means any agreement between any individual, firm, or corporation and the State or any political subdivision of the State other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the State, including, but not limited to, matching expenditures, grants, loans, insurance, or guarantees.

(b) (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race,

color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut. The contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved; (2) the contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the contractor agrees to comply with each provision of this section and Conn. Gen. Stat. Sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to Conn. Gen. Stat. Sections 46a-56, 46a-68e, and 46a-68f; (5) the contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records, and accounts concerning the employment practices and procedures of the contractor as they relate to the provisions of this section and Conn. Gen. Stat. Section 46a-56. If the contract is a public works contract, the contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project.

(c) Determination of the contractor's good faith efforts shall include, but shall not be limited to, the following factors: The contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The contractor shall include the provisions of subsection (b) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor, or manufacturer unless exempted by regulations or orders of the Commission. The contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Conn. Gen. Stat. Section 46a-56; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The contractor agrees to comply with the regulations referred to in this section as they exist on the date of this contract and as they may be adopted or amended from time to time during the term of this contract and any amendments thereto.

B. (a) (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) the contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to Section 46a-56 of the Connecticut General Statutes; (4) the

contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records, and accounts concerning the employment practices and procedures of the contractor that relate to the provisions of this section and Section 46a-56 of the Connecticut General Statutes.

(b) The contractor shall include the provisions of subsection (a) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor, or manufacturer unless exempted by regulations or orders of the Commission. The contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Section 46a-56 of the Connecticut General Statutes; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(c) The contractor agrees to comply with the regulations referred to in this section as they exist on the date of this contract and as they may be adopted or amended from time to time during the term of this contract and any amendments thereto.

C. This contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill promulgated June 16, 1971, and, as such, this contract may be cancelled, terminated, or suspended by the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Three, or any State or federal law concerning nondiscrimination, notwithstanding that the State Labor Commissioner is not a party to this contract. The parties to this contract, as part of the consideration hereof, agree that said Executive Order No. Three is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the State Labor Commissioner shall have continuing jurisdiction in respect to contract performance in regard to nondiscrimination, until the contract is completed or terminated prior to completion.

The contractor agrees, as part consideration hereof, that this contract is subject to the Guidelines and Rules issued by the State Labor Commissioner to implement Executive Order No. Three, and that he will not discriminate in his employment practices or policies, will file all reports as required, and will fully cooperate with the State of Connecticut and the State Labor Commissioner.

D. This contract is subject to the provisions of Executive Order No. Seventeen of Governor Thomas J. Meskill promulgated February 15, 1973, and, as such, this contract may be cancelled, terminated, or suspended by the contracting agency or the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Seventeen, notwithstanding that the State Labor Commissioner may not be a party to this contract. The parties to this contract, as part of the consideration hereof, agree that Executive Order No. Seventeen is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the contracting agency and the State Labor Commissioner shall have joint and several continuing jurisdiction in respect to contract performance in regard to listing all employment openings with the Connecticut State Employment Service.

E. This contract is subject to the provisions of Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, and, as such, the contract may be canceled, terminated, or suspended by the State for violation of or noncompliance with said Executive Order No. Sixteen. Executive Order No. Sixteen is attached hereto and made a part hereof. The parties agree to comply with such executive order. In addition, the contractor agrees to include a copy of Executive Order No. Sixteen, and the requirement to comply with said executive order, in all contracts with its contractors, subcontractors, consultants, sub-consultants, and vendors.

F. This contract is subject to the provisions of the City of New London Sexual Harassment Policy ("Policy") and, as such, the contract may be canceled, terminated, or suspended by the City in the event that the contractor, its employees, contractors, subcontractors, consultants, sub-consultants, or vendors engages in behavior prohibited by the provisions of the Policy (a copy of the Policy is attached hereto). The contractor agrees to include a copy of the Policy, and the requirement to prevent behavior as defined in such Policy, in all contracts with its contractors, subcontractors, consultants, sub-consultants, and vendors.

G. Notwithstanding anything herein to the contrary:

(A)(1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, sexual orientation, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the state of Connecticut. The Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or ·on behalf of the Contractor, to state that it is an ."affirmative action-equal opportunity employer" in accordance with regulations adopted by the commission; (3) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the commission advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e,46a-68f and 46a-86; (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this section and section 46a-56.

(2) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the state of Connecticut, and that employees are treated when employed without regard to their sexual orientation; the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; the contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to section 46a-56; and, the contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor which relate to the provisions of this section and section 46a-56.

(B) Any Contractor who is a party to a municipal public works contract or quasi-public agency project, where any such contract is valued at less than $50,000 for each year of the contract, shall provide the Commission on Human Rights and Opportunities with a written or electronic representation that complies with the nondiscrimination agreement and warranty under subsection (A)(1) above, provided if there is any change in such representation, the Contractor shall provide the updated representation to the Commission not later than 30 days after such change. Any Contractor who is a party to a municipal public works contract or a quasi-public agency project, where any such contract is valued at $50,000 or more for any year of the contract, shall provide the Commission with any one of the following: (1) Documentation in the form of a company or corporate police adopted by resolution of the board of directors, shareholder, managers, members or other g9overning body of such Contractor that complies with the nondiscrimination agreement and warranty under subsection (A)(1) of this section; (2) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such contractor if (a) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and the executive director of the Commission on Human Rights and

Opportunities or designee certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section; or (3) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section and is in effect on the date the affidavit is signed..

(C) If the Contract is a municipal public works contract or a quasi-public agency project, the Contractor agrees and warrants that s/he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project. The Contractor shall include the provisions of subdivision (A)(1) of this section in every subcontract or purchase order entered into to fulfill any obligation of a municipal public works contract or contract for a quasi-public agency project, and such provisions shall be binding on a subcontractor, vendor or manufacturer, unless exempted by regulations or orders of the Commission on Human Rights and Opportunities. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions, including sanctions for noncompliance in accordance with section 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission regarding a state contract, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

(D) "Minority business enterprise" means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements. Determination of the Contractor's good faith efforts shall include, but shall not be eliminated to, the following factors: The contractor's employment and subcontracting policies, patterns and practices; affirmative advertising recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission on Human Rights and Opportunities may prescribe that are designed to ensure the participation of minority business enterprises in municipal public works contracts or quasi-public agency projects. "Municipal public works project" means that portion of an agreement entered into on or after October 1, 2015, between any individual, form or corporation and a municipality for the construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, which is financed in whole or in part by the state, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees but excluding any project of an alliance district, as defined in section 10-262u, finance by the state funding in an amount equal to fifty thousand dollars or less. "Quasi-public agency project" means the construction, rehabilitation, conversion, extension, demolition or repair of a building or other changes or improvements in real property pursuant to a contract entered into on or after October 1, 2015, which is financed in whole or in part by a quasi-public agency using state funds, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

(E) The Contractor, general contractor or trade contract, hereby acknowledges that it shall be required to comply with the provisions of General Statute §4a-60g and the requirements concerning nondiscrimination and affirmative action under General Statute §4a-60 and §4a-60a.

19. Force Majeure: Neither party shall be liable to the other or be deemed to be in breach of this Contract for any failure or delay in rendering performance arising out of causes beyond its reasonable control and without its fault or negligence. Such causes may include, but are not limited to, acts of God or of a public enemy, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather. Dates or times of performance shall be extended to the extent of delays excused by this section, provided that the party whose performance is affected notifies the other promptly of the existence and nature of such delay.

20. Compliance with Laws and Indemnification of the City of New London: The Contractor shall comply with all applicable laws, rules, regulations, ordinances, orders or requirements of the State of Connecticut and any governmental authority relating to the delivery of the services specified in this Contract. The City may require the Contractor to pay fines, penalties, and damages that may arise out of or may be imposed because of, the
Contractor's breach or failure to comply with the provisions of this Contract. Unless otherwise provided by law the Contractor shall indemnify and hold harmless the City, its agents, officers and employees against any and all liability, loss, damages, penalties, costs or expenses for personal injury or damage to real or tangible personal property which the City may sustain, incur or be required to pay resulting from, arising out of, or in connection with the services performed or delivered under this Contract by reason of acts, inactions, omissions, negligence, reckless or intentional misconduct of the Contractor, its agent(s), officers, employees or subcontractors; provided that the Contractor is notified of any claim within a reasonable time after the City becomes aware of it, and the Contractor is afforded an opportunity to participate in the defense of such claim. In such event, no negotiated settlement agreement shall be binding on the Contractor without the Contractor's concurrence.

21. Waivers And Severability: All conditions, covenants, duties and obligations contained in this Contract can be waived only by written agreement. Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any way limit the legal or equitable remedies available to that party. A waiver or breach of any term, condition, or covenant by a party shall not constitute a waiver or breach of any other term, condition or covenant. If any court of competent jurisdiction declares a provision of this Agreement invalid, illegal, or otherwise unenforceable, the remaining provisions of the Agreement shall remain in full force and effect.

22. Amendments: No amendment to this Contract shall be effective unless it is signed by authorized representatives of both parties and complies with all other regulations and requirements of law.

23. Entire Agreement: The parties understand and agree that this Contract and attachments (if any), which includes all Contract Documents, supersede all other verbal and written agreements and negotiations by the parties relating to the services under this Contract.

24. Notice: Unless otherwise specified in an attachment hereto, any notice hereunder shall be in writing addressed to the persons and addresses indicated in the caption of this Contract on page 1.

IN WITNESS WHEREOF, the parties hereto have caused this AGREEMENT to be executed in two (2) original copies on the day and year first above written.

OWNER:

_____

Michael Passero
Its Mayor

CONTRACTOR:

_____

Its Owner or Duly Authorized Agent

Approved as to form:

_____

Jeffrey T. Londregan, Esq., Director of Law

Date Signed _____

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. The Project consists of the complete interior and exterior restoration of the historic New London City Hall, located at 100 State Street, New London, CT 06320, as shown on Contract Documents prepared by Architectural Preservation Studio, PC (APS), dated November 1, 2016.

B. Project Team:

Architect:
Mr. Carl Rothbart – Project Manager
Architectural Preservation Studio, PC (APS)
58 Pine Street, New Canaan, CT 06840
(203) 594-9735

M/E/P Engineer:
Mr. Larry Devito – Project Manager
Lawrence Mechanical, PC (LMPC)
280 Elm Street, New Canaan, CT 06840
(203) 966-5791

Owner:
City of New London
Mr. Tom Bombria - Community Development Coordinator
New London City Hall
181 State Street
New London, CT 06320
(860) 437-6346

C. Summary by Reference: Work of the Contract can be summarized by reference to the Contract, Supplementary Conditions, Specification Sections as listed in the "Table of Contents", and Drawings as listed in the "Schedule of Drawings" bound herewith, Addenda and modifications to the Contract Documents issued subsequent to the initial printing of this project manual, and including but not necessarily limited to printed matter referenced by any of these.

D. Summary of Work: The following, in conjunction with the Drawings and technical specification sections, shall identify the items of work for each building of this project:

1.3 SPECIAL CONDITIONS

A. **HAZMAT Abatement**: The existing building materials contain lead and asbestos materials. All HAZMAT abatement is the Contractor's responsibility. The Contractor shall comply with all current regulations per all/any agencies having jurisdiction in the proper testing, removal and disposal of all/any asbestos and lead containing materials as part of the Base Bid.

1.4 BID BREAKDOWN – BASE BID LUMP SUM ITEMS

A. Base Bids provided by the Contractor shall include all labor, supervision, materials, overhead, profit and taxes necessary to perform the full extent of the work as described herein and in the Drawings.

B. Note: This list is not exhaustive. Refer to the contract documents; including the contract drawings and technical specifications for additional requirements.

General Requirements

1. Install scaffolding, sidewalk bridging and work platforms, etc. as necessary to allow access to all work areas and to protect the public and existing building and site elements.
2. Provide all general conditions and all temporary facilities and services required for the execution of the work.
3. Test, remove and dispose of all asbestos and lead containing materials complying with all current regulations per all agencies having jurisdiction.

Site

1. Dismantle and reset displaced stone elements at the perimeter granite site wall.
2. Repoint all open mortar joints in the granite perimeter site and retaining walls.
3. Clean all areas of stained granite and limestone walls and stairs throughout the site.
4. Remove all improper patches, properly patch or install dutchmen as required.
5. Remove existing concrete ADA ramp and railing and install new poured in place ADA ramp, landing and railings to meet all code requirements.
6. Remove/reset existing block pavers at sidewalk in area at the base of the ADA ramp to provide a level landing.
7. Refinish original bronze hand railings at main entrance.
8. Extend landing and install new hand railing at north entrance steps and install new railing at the unused stair on the north façade.
9. Repair corroded grates, hatches and grills at all lightwells and install new grates, hatches and grills where shown on drawings.

Exterior

1. Repoint all open mortar joints and repair cracks throughout façade.
2. Replace sealant at all failed or improperly installed caulked joints.
3. Remove inappropriate patches, properly repair and install dutchmen.
4. Repair anchorage at spalls and voids in limestone and install dutchmen.
5. Remove all stains on masonry and clean all facades.
6. Remove plywood infill at all window and north entrance door pediments and existing bird-proofing and install bird-proofing as specified.

7. Scrape, prime, paint and repair or replace as necessary metal windows on first floor level, east facade, and exterior fire stair and at steel bracing at rooftop chimney.
8. Infill all window openings at existing/newly expanded vault locations.
9. Repair, refinish, and paint cast iron railings on second floor loggia balcony.
10. Clean, repair/restore/replace tile flooring at the second floor loggia balcony.
11. Install new ADA-compliant doorway and transom at south main entrance and install ADA-compliant push-button door opener.
12. Provide ADA signage directing handicapped to ADA entrances

Interior – Restoration

1. Prior to start of work, city shall be responsible for inventorying and removal of all removable plaques, paintings, three-dimensional artifacts, etc. for safe-keeping during duration of project.
2. Prior to start of work, city shall be responsible for inventorying all non-removable plaques, painting, three-dimensional artifacts, etc. Contractor shall coordinate with city and shall be responsible for protection of same for duration of project.
3. Identify and inventory all removed and stored original building elements such as doors, trim, molding, bronze grates, etc. and carefully remove from building to secure storage site for restoration and reuse where applicable in building. Coordinate with architect.
4. Identify and carefully remove all doors, trim, molding, etc. at walls to be removed. Inventory removed elements and remove to secure storage site for reuse where applicable in building. Coordinate with architect.
5. Repair damaged plaster walls, ceilings and ornament to match original and scrape, prime, paint all existing/new plaster and/or gypsum finishes.
6. Repair/replace damaged original wood paneling, trim, doors, chair and picture rails to match original and restore finishes to match original.
7. Remove all carpeting/vat covering existing wood and ceramic tile flooring, repair/replace/restore flooring to match original.
8. Repair and properly patch all damaged areas of marble mosaic flooring in lobby areas and clean to match original finish.
9. Remove entire existing elevator system and shaft, repair/reinforce floor structure and restore marble mosaic flooring at first floor level.
10. Rrestore/repair marble stair following removal of existing elevator to match original construction; replace aluminum handrail with new bronze handrail and clean entire stair structure.
11. Rehang existing wood doors and transoms to restore original door swing and install new wood doors to match original where indicated and install new aromatic door closers at all doors indicated on the drawings.
12. Relocate WPA mural where indicated on the drawings.

Interior – New Construction

1. Install new level poured-in-place concrete floor in basement boiler room.
2. Excavate and provide new pipe chases in unexcavated area of basement where indicated on the drawings.
3. Provide new metal doors and frames in the basement where indicated on the drawings.
4. Install new ADA-compliant elevator system with all required equipment and finishes and new fire rated elevator equipment room in basement.
5. Remove existing toilet rooms and install new ADA compliant toilet rooms including all enclosures, fixtures, accessories and finishes.

6. Remove existing mail room enclosure at the first floor level and restore finishes.
7. Remove existing dropped acoustical and applied tile ceilings and install new suspended floating ceiling clouds and open grid systems.
8. Reconfigure existing first floor toilet room to provide custodial and storage closet.
9. Provide new ADA-compliant water fountains at each floor level.
10. Install new fire rated electrical equipment/tech closets on all floor levels.
11. Enlarge city clerk vault to bring into compliance per CT library audit.
12. Provide ADA-compliant push-button door opener at south entrance vestibule doors.
13. Reconfigure walls and doors at office spaces at the first and second floor levels.
14. Remove sliding glass door and sheetrock walls at the mayor's suite and install new walls and historic door.
15. Create new passageway at closets between Mayor's Office and CAO office.
16. Remove existing lower raised platform at the council chamber and restore existing cork flooring throughout council chamber.

HVAC Systems

1. Convert the existing steam boiler, which is currently fueled by number 2-oil, to burn natural gas to generate hot water for space heating.
2. Decommission the existing low pressure steam (LPS) space heating system. Remove existing space heating system components and distribution piping where readily accessible. Abandon existing steam piping in place where concealed by permanent building components.
3. Provide a new 4-pipe fan coil unit (FCU) system with supplemental outside air to heat, cool and ventilate. New FCUs shall serve offices, and be provided with two separate coils: one coil connected to chilled-water piping, the other coil connected to hot-water piping.
4. Provide single zone central station air handling units (AHU) to serve the council chamber, the lobbies and provide supplemental outside for offices supplied by FCUs.
5. Chilled water shall be generated by a water-cooled chiller located in the basement. Heat removed from the building by the chiller shall be discharged by a cooling tower located at grade. Chilled water, condenser water and hot water pumps shall be located in the basement.
6. New air-distribution ductwork shall run on each floor level.
7. Office ventilation shall be provided by separate 100% outside-air units located in the basement and attic. Air-distribution main ductwork shall run in the basement and attic with branches to individual rooms.
8. A dedicated heat pump shall be provided for the City Clerks vault. A split system ac unit shall serve the second floor data closet.

Code/General

1. Provide a fire-rated enclosure for new hydraulic elevator machine equipment.
2. Provide separate flue for domestic hot-water heater.
3. Provide adequate provisions for ventilation in the basement.
4. Provide a break glass" button for emergency boiler shutdown.
5. Install a new BMS system that will monitor and control the various mechanical systems, as well as any future security and lighting systems from local (city hall) or remote locations.

Electrical

1. Complete demolition of the existing electrical systems and replacement with new equipment as described below.
2. Install new lighting system for general, emergency and exit lighting. The lighting will generally be led sourced, dimmed, and have an overall lighting controller.
3. Replace exterior lighting for front steps and building facade.
4. The removal, restoration and reinstallation of the existing "antique" lighting instruments serving the lobbies, main stair, council chamber and front torchieres shall be performed by others. Power and modern lighting controls for these fixtures shall be provided under the subject electrical contract as indicated in the contract documents.
5. Provide a 1200a, 120/208v, 3 phase power supply system. This system will supply current needs and provide for future load growth.
6. Install a separate panelboard and distribution system for sensitive computer loads as opposed to more general electrical loads.
7. Provide provision for a solidly bonded and grounded data distribution system.
8. Provide provision for a building horizontal cabling system, data links, connecting each desk top location to a central building collection point patch panel.
9. Provide for the certification testing of each data link.
10. Provide a complete detection fire alarm system with voice annunciation.

Plumbing/Fire Protection

1. Provide a new domestic potable water system, including a new backflow prevention device at water service entry.
2. Decommission the existing domestic water system. Remove existing plumbing components and distribution piping where readily accessible. Abandon existing piping in place where concealed by permanent building components.
3. Replace existing domestic hot water heater.
4. Provide a partial fire suppression water sprinkler system serving the stair, lobbies, and city clerk's vault in accordance with approved code modification.
5. Provide fire department connection and backflow-prevention device.
6. Provide new gas service and distribution system to serve the boiler conversion.
7. Decommission the existing sanitary drainage system remove existing drainage system components and distribution piping where readily accessible. Abandon existing piping in place where concealed by permanent building components.
8. Provide a sewage ejector to serve the basement where it is not possible to drain solely under the force of gravity. Furnish and install floor drains. Provide a new storm drainage system and roof drains.

1.5. UNIT PRICE ITEMS - ADDITIONAL WORK

When approved in writing by the Owner/Architect the Contractor agrees to provide all labor, equipment and materials required for the complete execution of additional units of work, which may become necessary as the project progresses. The unit prices bid per item will hold for actual quantities measured and installed in the field. The same unit prices shall apply to additional work, as well as, for reducing the total cost of the work if the base contract includes more work than deemed necessary by the Owner/Architect. Each item shall include general conditions, overhead and profit and all other associated costs.

1. Repoint mortar joints (per linear foot).

2. Repair cracked natural stone (per linear foot).

3. Replace deteriorated natural stone (per square foot by 8" deep).

4. Replace existing sealant where directed (per linear foot)

5. Replace deteriorated wood flooring. (per square foot)

6. Replace deteriorated plaster finishes (per square foot)

1.6 ALLOWANCES

A. Contractor shall perform the allowance work indicated on the Bid Form if/as required, at the Owners request, to complete the proper roofing installation on a time and materials basis as drawn against the allowance upset limits.

1.	Structural Repair/Modification Allowance	$100,000
2.	Interior Wood Repair/Replacement Allowance	$50,000
3.	Interior Plaster Repair/Replacement Allowance	$50,000
4.	Concealed/Undiscovered Conditions Allowance	$50,000
5.	Exterior Subsurface Repair Allowance	$20,000

1.7 TIME AND MATERIALS

A. The Contractor agrees to perform additional work, not described in the Base Bids or Unit Prices, on a Time and Material Basis, at the hourly rates for workers provided by the Contractor in the Bid Form. No Time and Materials work shall be performed before Contractor is in possession of an approved Owner Change Order which specifically requests the performance of that work. Contractor shall include original itemized receipts for materials used in work with invoices for Time and Material work. Contractor will not be reimbursed by Owner for materials if the purchase of the materials is not documented by receipts.

1.8 INTERPRETATIONS

A. **Site Visit:** The Contractor shall visit the site during the bidding process to familiarize himself with all existing conditions. The Contractor shall be responsible for verifying the existing conditions and laying out the work as indicated on drawings, and informing the Architect, in writing, of any discrepancies, and shall not proceed with any work affected until receiving written instructions from the Architect via Addendum during the bidding period.

B. **Information**: All information relating to this contract shall be obtained from the Owner/Architect.

C. **Discrepancies**: During the course of the work, should any ambiguities or discrepancies be found on the Drawings or in the Specifications, or should any discrepancies be found between the Drawings and the Specifications, the Contractor shall apply to the Architect, in writing, with a copy to the Owner, for an interpretation and determination of the intent of the Drawings and Specifications. No verbal statement regarding the Contract by any person shall be authoritative.

D. **Drawings**: Figures and dimensions on all Drawings are approximate and shall be checked by the Contractor, who shall note any discrepancies and shall bring them to the attention of the Architect. The Contractor shall not alter the Specifications, Drawings or figures, nor make alterations or additions to the quantity, character or arrangement of materials or work, whether same shall involve additional work or not, unless same shall be agreed upon first in writing.

1.09 CONTRACTOR USE OF PREMISES

A. **Use of the Existing Building**: Maintain the existing building in a weathertight condition throughout the construction period. Promptly repair damage caused by construction operations. Take all precautions necessary to protect the buildings and its occupants during the construction period.

B. **Building Occupancy**: The building will to undergoing a complete renovation at the time of construction. All work must be coordinated with the Owner's Representative and other trades so that access to building is unobstructed and all surfaces are constantly protected from the weather. Access to all spaces within the building shall be coordinated with the Owner's Representative. The Contractor shall provide safe, free and easy access at all times to all entrances, exits, walks and stairs in and around the building. Work hours shall be 8:00 A.M to 4:00 P.M., Monday through Friday, except holidays.

E. **Special Site Requirements**: All Contractor employees must wear Owner approved photo identification cards while within the site limits. Smoking or the use of "boom boxes" will not be allowed within the site limits.

F. **Use of Existing Elevator**: The Contractor will be permitted to use the one small elevator in the building until it is schedule for demolition. Coordinate with the Owner's Representative.

G. **Use of Building Toilets**: The Contractor will be permitted the use of the building toilets until they are scheduled for demolition. Temporary toilets must then be provided with permission of the Owner's Representative in an Owner's Representative approved location.

H. **Photographs**: The Contractor shall photograph all interior and exterior spaces at work areas prior to starting roofing work and take ongoing progress photographs during the construction process. See Section 01323 – Photographic Documentation.

I. **Storage**: Location of storage areas shall be coordinated with the Owner's Representative.

J. **Trash Containers**: Location of trash containers shall be coordinated with the Owner's Representative.

1.10 GENERAL

A. Experience: Work must be performed by a firm employing personnel skilled in the indicated operations, and having not less than ten (10) years routine experience in successfully completing in a timely fashion restoration work comparable in scope and type to the required work of this contract involving buildings determined by the Government to be eligible for, or listed on, the National Register of Historic Places.

B. **Regulatory Requirements**: Work shall be carried out in accordance with all applicable Federal, State and local codes and requirements of other agencies having jurisdiction. In all cases the more restrictive limitation of any applicable requirements shall be followed.

C. All work shall conform to the requirements of the SHPO and the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings as well as all New London Historic District regulations.

D. **Materials and Methods**: All materials and methods of construction shall comply with the requirements of State and Local Building Codes.

E. **Workmanship**: The work shall be conducted in accordance with pertinent trade association standards and practices for materials and installation.

F. **Permits**, Etc.: Permits, inspections and certificates required by work under this contract shall be obtained at no charge to the Owner.

G. **Demolition**: Disassembly, demolition and removal shall proceed in an orderly manner minimizing noise or other disturbances to the operations of adjacent facilities. All debris and refuse shall be removed from buildings at end of each working day and properly disposed of off the Owner's property

H. **Condition of Structure**: Owner assumes no responsibility for the actual condition of the building, and conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable.

I. **Fires**: Fires for burning rubbish and debris or for any other purposes are forbidden. Any welding must be attended by a fire watch. Any hot kettles will observe proper safety requirements.

J. **Protection**: Protection of the existing buildings, lawns, trees, shrubs, pavement, curbs, other site features and other permanent improvements shall be installed and maintained as required. Any adjacent existing surfaces, motor vehicles or material damaged in the sequence of work shall be repaired or replaced to match original condition at no cost to the Owner. Where dust is being created, motor vehicles and other adjacent properties shall be protected. Do not leave buildings, or portion thereof, open to weather, nor inadequately protected when work is not actually in progress. Place temporary roll plastic material or other membrane taped or otherwise completely sealed before causing dust on adjacent property or vehicles or before any rain or snow begins. Clear the dust off any trees on a daily basis. Any damage occurring due to lack of protection shall be repaired

at the Contractor's expense to the satisfaction of the Owner and Architect. Take all measures necessary to protect all persons and property from damage and harm caused by the work of all sections.

K. **Clean-Up**: At the end of each work day, the Contractor shall leave the work area broom clean and dispose of all debris. Dumpster location and requirements shall be approved by the Owner. Upon final completion of the work, Contractor shall thoroughly clean up all dirt and waste resulting from their work as required to restore work areas to the state of cleanliness existing before work began. In general, cleaning requirements are limited to the removal of rubbish, spatters, stains, smears, foot tracks, dust, etc. and the washing of prime and storm windows.

L. **Superintendent**: The General Contractor's Superintendent and Foreman for all trades for the work of all sections shall be on site daily during the course of construction, shall speak the English language fluently, and shall have had a minimum of ten (10) years experience working on similar restoration projects.

M. In evaluating work offered by the Contractor for acceptance or rejection of work, no allowance will be made for lack of skill or competence on the part of workmen.

N. **Sidewalk Bridging/Scaffolding/Platforms**: The Contractor shall provide all sidewalk bridging, fixed scaffolding, planking, work platforms, hoisting and access stairs necessary for the performance of this project.

O. **Access**: Access shall be provided to all areas of the site, including scaffolding, when requested by the Owner's Representative or Architect.

P. **Fire Extinguishers and Other Fire Safety Measures:** As per all code requirements and as appropriate for the project. Provide two (2) water-type fire extinguishers for each torch or soldering irons

Q. **Temporary Power**: Provide weatherproof, grounded, power-distribution system sufficient to accommodate construction operations requiring power, use of power tools, etc. Provide overload protection. Connection to existing power shall be with equipment supplied by the Contractor. The Contractor shall provide their own source of power via generator's and pay for same.

R. **Temporary Water**: Temporary water shall be obtained from Owner's nearest source. All attachments, hoses, etc. shall be supplied by the Contractor. The Contractor shall make every effort to control and conserve the use of water.

S. **Temporary Covering**: Cover stored material exposed to weather off ground with tarpaulins with UL label and flame spread of 15 or less. Store sand on tarpaulins, not directly on ground.

T. **Temporary Work Structures**: Temporary structures for controlled on site work are subject to the site requirements of the Owner and all applicable codes, etc.

1.11 SUBMITTALS

A. Contractor to provide detailed schedule for all required submittal items for the Architects review upon award of the contract.

B. All mock-ups are to be supplied to the Owner for educational purposes upon their approval and not incorporated into the work.

C. **Products**: Submit 3 copies/units for General Contractor work, 4 copies/units for Sub-Contractor work of all product Data and samples of all specified products to Architect.

E. **Shop Drawings**: Submit shop drawings for all items where required in the individual sections of the specifications.

1. Before proceeding with the fabrication of materials or equipment requiring shop drawings, prepare and submit complete assembly, setting and detail drawings giving all information necessary for installation of such equipment and materials, and for demonstrating that it complies with the specifications.

1. A transparency (Ozalid) and two (2) black and white prints of each fully identified shop drawing shall be submitted to the Architect for approval at the earliest possible date.

2. Drawings shall be drawn to the following or a larger scale:

   (a) Plans, Elevations and Sections 1/4 inch scale.
   (b) Details: 3 inch scale.

3. The General Contractor shall check all shop drawings for conformance with contract requirements before submitting the drawings to the Architect for approval. A note shall be made on the drawings indicating that the Contractor has made this check. Shop Drawings will be returned without comment, with no extension of Contract Time if not so documented.

4. The Architect will, within ten days after the receipt of drawings, return to the Contractor the transparency with notations "Approved", "Approved with Corrections, as Noted", or "Returned for Correction".

5. Make necessary corrections and revisions on transparencies marked "Approved with Corrections as Noted", or "Returned for Correction" and resubmit transparencies and prints for approval in the same routine as for the original approval. Time required for such revision and resubmitting will not entitle the Contractor to any extension of time, but the Architect will examine and return such transparencies as promptly as possible.

6. Any changes to the drawings not requested by Architect/Owner shall be clearly labeled, otherwise they will be considered not reviewed, and Contractor's responsibility.

7. The Architect will keep one (1) black and white print of drawings noted "Approved as Noted" or "Returned for Correction" for its records.

8. Have prints made and submit shop drawings to Architect for distribution to all concerned as required for proper coordination. All documents shall pass through the Architects office first. One copy of all shop drawings marked "Approved" shall be forwarded to the Owner.

9. Any work done, material ordered or delivered by the Contractor prior to the receipt of transparency marked "Approved with Corrections as Noted", or "Approved" by the Architect shall be at the Contractor's risk. When the corrections have been made on transparencies marked "Approved with Corrections as Noted" prints of such transparencies may be used for fabrication unless specifically stated otherwise by the Architect.

10. If, at any time before the completion of the work, changes are made necessitating the revision of approved drawings, make such revisions and proceed in the same routine as for the original approval.

11. If the Architect requires additional copies of shop drawings, the Contractor without additional cost shall furnish them.

12. Sample requirements shall be as listed in individual specification sections.

1.12 MATERIAL STORAGE, PLACEMENT AND REMOVALS, MOBILIZATION PLAN, PROGRESS SCHEDULE

A. **Mobilization Plan**: Contractor shall, within one week of award of Contract, prepare for approval, in writing, a Mobilization Plan and Progress Schedule to include: (a) Distribution Plan for materials for installation describing method for transporting materials from ground level to appropriate locations for storage and installation. Include locations where materials will be temporarily stored; (b) Disposal Plan for debris, etc., describing method for transporting all debris (old materials, etc.) to ground level, proposed temporary location of debris containers, cartage locations. (c) All other information as required for proper execution of project.

B. **Schedule**: The Contractor shall prepare a detailed phased progress schedule covering all aspects of the contract work for the Architects and Owners review within two weeks of contract award. Schedule shall be CPM or other format acceptable to Architect, with weekly updating of actual progress.

1.13 ACCESS TO THE WORK

A. The Contractor shall provide the Architect and Owner continuous access to all work areas.

B. After the Work is completed, the Architect and Owner will examine the punch list for the work. The Contractor shall not remove the scaffolding/planking until the Architect and Owner has signed off that the Work is complete.

1.14 ASBESTOS CONTAINING MATERIAL

A. **Contractor shall comply with all current regulations per all agencies having jurisdiction in the proper removal and disposal of all asbestos/lead containing material**.

1.15 CUTTING, PATCHING AND REFINISHING

A. It shall be the responsibility of the Contractor to patch and refinish all openings created by either themselves or their subcontractors. Architect and Owner must approve all patching and refinishing work.

B. The Contractor shall at their own expense do all cutting, fitting or patching of their work in a neat and competent manner, and to the satisfaction of the Architect.

1.16 GUARANTEES

A. **Contractor's Guarantee**: In addition to warranties provided elsewhere in this document, the Contractor and/or Sub-contractor guarantees to the Owner that said Contractor shall be responsible for any defective materials and workmanship incorporated for the time periods stated in the individual specification sections. The period of guarantee shall start from the date of the Owner's acceptance of the work.

END OF SECTION 01010

NEW LONDON CITY HALL
INTERIOR AND EXTERIOR RESTORATION

181 STATE STREET, NEW LONDON, CONNECTICUT

BID FORM

NOVEMBER 1, 2016

APS PROJECT NO. 15-050

CONTRACTOR NAME

Having carefully examined the Specification, Drawings and associated bid documents dated November 1, 2016, as prepared by Architectural Preservation Studio, PC, 58 Pine Street, New Canaan, CT, 06840, as well as the premise and conditions affecting the work, The Contractor proposes to furnish all material, equipment, labor, supervision, plant, machinery, sidewalk bridging/scaffolding, tools, supplies, services, filing, permits, overhead, profit and insurance necessary to perform the work, as set forth in, and in accordance with said documents.

The work items summarized below are for bidding purposes only and may vary from actual work executed. The prices bid per item will hold for actual work executed in the field. The same prices shall apply to reducing the total scope of the work if the base contract includes more work than deemed necessary by the Owner/Architect as a result of the total cost of the work. Each item shall include general conditions, overhead and profit and all other associated costs.

BID BREAKDOWN

BASE BID LUMP SUM ITEMS

General Conditions

1. Provide all General Conditions, temporary facilities and staging/scaffolding required to perform the work of this contract.

   $_____

2. Test, remove and dispose of all asbestos and lead containing materials complying with all current regulations per all agencies having jurisdiction.

   $_____

General Conditions Lump Sum **Sub-Total** **$ _____**

Site Work

1. Perform all site work as indicated on the drawings and in the specifications.

   $_____

Site Work Lump Sum **Sub-Total** **$ _____**

Exterior Repairs

1. Perform all exterior repair work as indicated on the drawings and in the specifications.

   $_____

Exterior Repairs Lump Sum **Sub-Total** **$ _____**

Interior Restoration

1. Perform all interior work as indicated on the drawings and in the specifications for the interior restoration of interior finishes and materials.

   $_____

Interior Restoration Lump Sum **Sub-Total** **$ _____**

Interior New Construction

1. Perform all interior new construction work as indicated on the drawings and in the specifications (excluding items 2 and 3 below).

$_____

2. Install new ADA-compliant elevator system in new fire rated shaftway with all required equipment and finishes where and as indicated on the drawings.

$_____

3. Remove existing toilet rooms and install new ADA compliant toilet rooms including all enclosures, fixtures, accessories and finishes at all floors levels where and as indicated on the drawings.

$_____

Interior Repairs Lump Sum **Sub-Total** **$ _____**

M/E/P Systems

1. Perform all HVAC work as indicated on the drawings and in the specifications.

$_____

2. Perform all Plumbing work as indicated on the drawings and in the specifications.

$_____

3. Perform all Fire Suppression work as indicated on the drawings and in the specifications.

$_____

4. Perform all Electrical work as indicated on the drawings and in the specifications.

$_____

5. Perform all IT Technology work as indicated on the drawings and in the specifications.

$_____

M/E/P Lump Sum **Sub-Total** **$ _____**

LUMP SUM PRICE ITEMS	**Total**	**$ _____**
Cost of Payment Bond		$ _____
Cost of Performance Bond		$ _____
Structural Repair/Modification Allowance		$ 100,000.00
Interior Wood Repair/Replacement Allowance		$ 50,000.00
Interior Plaster Repair/Replacement Allowance		$ 50,000.00
Concealed/Undiscovered Conditions Allowance		$ 50,000.00
Exterior Subsurface Repair Allowance		$ 20,000.00
GRAND TOTAL		$ _____

UNIT PRICE ITEMS – ADDITIONAL WORK

When approved in writing by the Owner/Architect the Contractor agrees to provide all labor, equipment and materials required for the complete execution of additional units of work, which may become necessary as the project progresses. The stated estimated quantities are for bidding purposes only and may vary from actual work executed. The unit prices bid per item will hold for actual quantities measured and installed in the field. The same unit prices shall apply to additional work, as well as for reducing the total cost of the work if the base contract includes more work than deemed necessary by the Owner/Architect. Each item shall include general conditions, overhead and profit and all other associated costs.

1. Repoint mortar joints (per linear foot).
   $_____

2. Repair cracked natural stone (per linear foot).
   $_____

3. Replace deteriorated natural stone (per square foot by 8" deep)).
   $_____

4. Replace deteriorated wood flooring. (per square foot)).
   $_____

5. Replace deteriorated plaster finishes (per square foot)
   $_____

6. Replace existing sealant (per linear foot).

$_____

CHANGE ORDER WORK

General Conditions – General Contractor %_____

General Conditions – Sub Contractor %_____

Overhead & Profit – General Contractor %_____

Overhead & Profit – Sub Contractor %_____

TIME AND MATERIALS RATES

The Contractor agrees to perform additional work, not described in the Base Bids or Unit Prices, on a Time and Material Basis, at the hourly rates for workers provided by the Contractor on his Rate Sheet appended to the Bid. No Time and Materials work shall be performed before Contractor is in possession of an approved Change Order, which specifically requests that work. Contractor shall include original itemized receipts for materials used with invoices for Time and Material work. Contractor will not be reimbursed by the Owner for materials if their purchase is not documented by receipts.

PRINCIPLE SUBDIVISIONS OR ELEMENTS OF THE WORK TO BE PERFORMED BY CONTRACTOR'S FORCES

If awarded a Contract, we will perform the following portions of the work with forces directly employed by the undersigned:

_____ _____

_____ _____

_____ _____

PRINCIPAL SUBCONTRACTORS

If awarded a Contract, we will employ the following subcontractors for portions of work not performed directly by the undersigned:

_____ _____

_____ _____

_____ _____

SCHEDULES AND PHASING PLANS

The undersigned shall provide a preliminary project schedule at time of bid identifying estimated time per building and overall completion dates. Prior to the award of a construction contract and upon the request of the Architect or Owner, the Contractor shall submit a complete, itemized and

detailed "Schedule of Values," progress schedule and phasing plan also indicating all site disruptions and staging areas.

ADDENDUM RECEIPT

Receipt of the following addenda to the Terms and Conditions, Drawings or Specifications is acknowledged:

Addendum No._____ Dated _____

Addendum No._____ Dated _____

Addendum No._____ Dated _____

Addendum No._____ Dated _____

Addendum No._____ Dated _____

Addendum No._____ Dated _____

_____
(Bidder)

_____
(By)

_____
(Title)

_____
(Business Address)

_____

_____
(Dated)

SECTION 01250 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01210 - Allowances.
2. Section 01600 - Product Requirements.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
   b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    b. Substitution request is fully documented and properly submitted.
    c. Requested substitution will not adversely affect Contractor's construction schedule.
    d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    e. Requested substitution is compatible with other portions of the Work.
    f. Requested substitution has been coordinated with other portions of the Work.
    g. Requested substitution provides specified warranty.
    h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

SECTION 01260 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Requirements:

1. Section 012500 - Substitution Procedures.

1.3 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 Bulletin form.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect or Construction Manager 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. Work Change Proposal Requests issued by Architect or Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of 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.

e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim 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 Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701

1.7 CONSTRUCTION CHANGE DIRECTIVE

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01260

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project Web site.
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
1. Section 013200 - Construction Progress Documentation.
2. Section 017300 - Executions.
3. Section 017700 - Closeout Procedures.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at

Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
   b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
   c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates,

angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Show the following:

   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

   a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes dimensioned from column center lines.

8. Fire-Protection System: Show the following:

   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Preparation Format: DWG Version 2009 operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.

4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

   a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b. Digital Data Software Program: Drawings are available in AutoCAD version 2009

c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 3 working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.

d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01260 - Contract Modification Procedures.

   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 5 days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises and existing building.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.

d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.

g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
i. Submittal procedures.
j. Coordination of separate contracts.
k. Owner's partial occupancy requirements.
l. Installation of Owner's furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.

16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:

1. Section 01330 - Submittal Procedures.
2. Section 01400 - Quality Requirements.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. PDF electronic file.

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

H. Special Reports: Submit at time of unusual event.

I. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date. Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date. Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Temporary enclosure and space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

1. Temporary enclosure and space conditioning.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project for Windows XP operating system.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first **90** days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Work Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

SECTION 01323 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

B. Related Requirements:
1. Section 01330 - Submittal Procedures.
2. Section 01770 - Closeout Procedures.
3. Section 01790 - Demonstration and Training.

1.3 BASE BID

A. Basis for Bids: Base number of construction photographs on average of 20 photographs per week over the duration of Project.

1.4 INFORMATIONAL SUBMITTALS

A. 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, story or room or area where photograph is taken. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 10.5 megapixels.
2. Format: Minimum 4000 by 2672 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:

    a. Name of Project.
    b. Name and contact information for photographer.
    c. Name of Architect

d. Name of Contractor.
e. Date photograph was taken.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

C. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.

1. Format: 8-by-10-inch smooth-surface matte prints on single-weight, commercial-grade photographic paper; enclosed back to back in clear plastic sleeves that are punched for standard three-ring binder.
2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:

a. Name of Project.
b. Name and contact information for photographer.
c. Name of Architect
d. Name of Contractor.
e. Date photograph was taken if not date stamped by camera.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

1.5 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.

1.6 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 JPG format, produced by a digital camera with minimum sensor size of 10.5 megapixels, and an image resolution of not less than 4000 by 2672 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

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

B. General: Take photographs using the maximum range of depth of field, 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 file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

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

1. Flag construction limits before taking construction photographs.
2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take minimum 5, maximum 10 photographs weekly

F. Final Completion Construction Photographs: Take 40 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.

1. Do not include date stamp.

END OF SECTION 01323

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
   1. Section 01320 - Construction Progress Documentation.
   2. Section 01782 - Operation and Maintenance Data.
   3. Section 01783 - Project Record Documents.
   4. Section 01790 - Demonstration and Training.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

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

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

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time

required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD version 2009
    c. Contractor shall execute a “Release of Electronic Files” form provided by the Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 7 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 14 days for initial review of each submittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.

d. Name of Construction Manager.
e. Name of Contractor.
f. Name of firm or entity that prepared submittal.
g. Names of subcontractor, manufacturer, and supplier.
h. Category and type of submittal.
i. Submittal purpose and description.
j. Specification Section number and title.
k. Specification paragraph number or drawing designation and generic name for each of multiple items.
l. Drawing number and detail references, as appropriate.
m. Location(s) where product is to be installed, as appropriate.
n. Related physical samples submitted directly.
o. Indication of full or partial submittal.
p. Transmittal number, numbered consecutively.
q. Submittal and transmittal distribution record.
r. Other necessary identification.
s. Remarks.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post large electronic submittals (exceeding 2MB) as PDF electronic files directly to Architect's FTP site specifically established for Project.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

    a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches
3. Submit Shop Drawings in the following format:

    a. PDF electronic file.

4. BIM File Incorporation: Develop and incorporate Shop Drawing files into Building Information Model established for Project.

    a. Prepare Shop Drawings in the following format: REVIT version 2009
    b. Refer to Section 013100 "Project Management and Coordination" for requirements for coordination drawings.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample set; remainder will be returned.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated. Sample will be retained by Architect
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with Contract Documents performance requirements.

U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM File Incorporation: Incorporate delegated-design drawing and data files into Building Information Model established for Project.

1. Prepare delegated-design drawings in the following format: REVIT version 2009

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

C. Related Requirements:

1. Section 012100 - Allowances.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic

effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality

levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems 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. Fabricator Qualifications: A firm experienced in producing products 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.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

    1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

    1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
    2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

    1. Contractor responsibilities include the following:

        a. Provide test specimens representative of proposed products and construction.

b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

M. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide maximum two room mockups, at the choice of the Architect.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.

2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01730 - Execution.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

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 (The) www.aluminum.org	(703) 358-2960
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association	(202) 824-7000

	www.aga.org	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, andRefrigeration Institute, The www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
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
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
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
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International	(800) 843-2763

	(American Society of Mechanical Engineers International) www.asme.org	(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) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association	(630) 584-1919

	www.cisca.org	
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	 (703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200 (800) 328-6306
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
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
ECA	Electrical Components Association www.ec-central.org	(703)907-8024
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee	(703) 295-6000

	http://content.asce.org/ejcdc/	
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	(800) 967-5352
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550

IAPSC	International Association of Professional Security Consultants www.iapsc.org	(515) 282-8192
ICBO	International Conference of Building Officials www.iccsafe.org	(888) 422-7233
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
ICPA	International Cast Polymer Association www.icpa-hq.org	(703) 525-0320
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society of North America www.iesna.org	(703) 525-0320
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISA	Instrumentation, Systems, and Automation Society, The www.isa.org	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (801) 341-7360
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11

KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSEA	Light Gauge Steel Engineers Association www.arcat.com	(202) 263-4488
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. 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 (604) 298-7578
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	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (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
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 222-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
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 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
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)	(901) 526-5016

	www.nofma.org	
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
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
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.cee.uiuc.edu	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(248) 848-3180
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	 (706) 882-3833
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SCAQMD	South Coast Air Quality Management District www.aqmd.com	(909) 396-2000
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888

SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
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
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333

TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
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
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
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	(800) 795-1747
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association	(800) 550-7889

	www.wmmpa.com	(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.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
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.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322

FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
NCHRP	National Cooperative Highway Research Program (See TRB)	
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 Buildings Service (See GSA)	
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202) 690-7694
USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of 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.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

F. State 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01010 - Summary of Work.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in NYC Building Code 2008 Edition.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches

C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section – 01010 – Summary of Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet 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.

F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate

ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

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

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.

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

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

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

L. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Core i5, (Quad Core 3.3 GHz processing speed minimum.
2. Memory: 16 gigabyte.
3. Disk Storage: 1 Terabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 21-inch LCD monitor.
5. Full-size keyboard and mouse.
6. Network Connectivity: RJ45 port.
7. Operating System: Microsoft Windows 7 or 10 Professional 64-bit.
8. Productivity Software:

    a. Microsoft Office Professional, including Word, Excel, Project and Outlook.

b. Adobe Reader 10.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
10. Internet Service: ISP router, equipped with hardware firewall, providing minimum 30 Mbps upload and 60 Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
12. Backup: External hard drive, minimum 1 terabyte, with automated backup software providing daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: On-site parking is not available. Contractor shall find public parking areas for construction personnel.

D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

   a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

G. Existing Elevator Use: Use of Owner's existing elevator will be permitted until the elevator is removed for the installation of the new elevator.

1. Do not load elevator beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

I. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

J. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

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

E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

G. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrances, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

I. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion of last Phase Construction

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 01500

SECTION 01500 - SCAFFOLDING AND SIDEWALK BRIDGING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

B. Drawings have been included with this Specification of existing building and site conditions to aid the Contractor in estimating the work described herein. The Drawings are intended as a reference guide only. All dimensions are to be verified by the Contractor. Drawings indicate conditions as viewed by the Architect and should not be construed as complete or accurate without inspection of building and site by Contractor.

D. Security System. Security system for the sidewalk bridge and scaffold to prevent unauthorized access to the scaffolding, the building, stored materials, temporary shelters, etc. shall be the responsibility of the Contractor. The Owner shall approve all security systems prior to installation.

1.2 DECLARATION OF PERFORMANCE SPECIFICATION

A. Specific performance and administrative minimum requirements and limitations are specified in this Section, as extensions of provisions in "General Conditions." No omission from this Section will be recognized as an indication by Architect that such omitted work, facilities or actions are not required for the successful completion of the job in compliance with all applicable legal requirements.

1.3 SUMMARY OF WORK

A. Contractor shall provide all labor and materials necessary for the complete installation of the items listed below as described in this specification.

1. Fixed scaffolding in phases around entire perimeter of building from grade to the roof level, with platforms at each floor level and all required shoring and/or support systems.

2. Sidewalk bridging where necessary to protect the public during the construction process including lighting under bridge.

3. Access, work platforms and planking providing both circulation through the scaffolding and direct access to the building facades and all roof surfaces.

4. Stair tower facilitating personnel traffic between the various levels of scaffolding.

5. Safety netting completely around scaffolding to prevent falling of debris and tools.

6. Contractor proposed staging areas as approved by the Owner.

7. Interior scaffolding, lifts, work platforms and protection as required for the execution of the contract work.

1.4 INTERRUPTION OF BUILDING FACILITIES AND CIRCULATION

A. While the scaffolding work of contract is proceeding, the Contractor shall not block any entrances to the building nor significantly disturb the flow of pedestrian and vehicular traffic into and around the building without the express written permission of the Owner. Such interference shall be as brief as possible and only at times agreed upon.

B. The Contractor shall not interrupt any electrical, mechanical, plumbing or other building services, or utilize any space inside the building and basements, without the express written permission of the Owner.

1.5 DAMAGE

A. Should the building suffer damage of any nature during the installation of items listed herein, the Contractor shall report the conditions and circumstances to the Architect. If damage is due to Contractor's negligence, he shall pay at his own expense for all necessary repairs and replacements to such damaged areas with new materials to identically match existing in every respect, as approved by Architect.

B. Any staining of the building due to corrosion of the scaffolding or its accessories or from any other related cause shall not be permitted. The Contractor shall clean immediately, at the Architect's direction, any stains resulting from the scaffolding installation, in a manner approved in writing by the Architect.

C. The grass and landscaping around the perimeter of the building and in any staging areas shall be protected from damage from the installation of the scaffolding system and performance of the work. Damage to the grass and landscaping shall be repaired/replaced on an allowance basis up to $5,000. Any costs beyond the allowance amount needed to repair the landscaping shall be incurred by the Contractor.

1.6 SAFETY

A. The Contractor shall provide all necessary safeguards as required in conjunction with the performance of his Work, such as netting, barricades, fences, etc. to protect the public, the building occupants, and the workmen from injury per all applicable codes.

1.7 SUBMITTALS

A. Product Data: Submit four copies of manufacturer's specifications and other data for all scaffolding each manufactured product, including certification that each product complies with specified requirements. Include instructions for handling, storage, installation and protection of each product.

1.8 APPROVALS

A. The Contractor shall obtain and renew all permits required by all city and state agencies for all work to be performed.

1.9 QUALITY ASSURANCE

A. Comply with all specific requirements indicated in these contract documents and all applicable codes.

B. Drawings for the pipe scaffolding must be designed and sealed by an Engineer registered in the State of Connecticut retained by the Contractor at his own cost. Four (4) sets of drawings must be submitted to the Architect.

1.10 MAINTENANCE

A. Contractor shall periodically inspect scaffolding anchors, scaffolding structure and sidewalk bridging and shall make all necessary painting repairs and maintenance including daily clean-up.

1.11 SHOP DRAWINGS

A. Contractor shall provide four complete sets of shop drawings for all typical details of the scaffolding and sidewalk bridging. All drawings are to be submitted for approval to the Architect and his Structural Engineer prior to obtaining all necessary approvals from appropriate agencies. Shop drawings shall include:

1. Shoring and/or support systems which shall be designed by an Engineer.

2. Drawings of all scaffolding, bridging, etc. showing locations of vertical and horizontal members in plan and elevation.

3. Tie back system for securing scaffolding to building.

4. Location of stair tower.

5. Staging area and method of roof protection.

6. Details of the hoist and support system as/if required.

1.12 JOB CONDITIONS

A. Contractor shall arrange with Architect or the Owner for means of access to premises and necessary utilities, space for storage of material and equipment, etc.

B. Contractor shall provide, at all times, protected access to the building for the public, employees, and service and emergency vehicles.

PART 2 - PRODUCTS

2.01 SCAFFOLDING AND BRIDGING

A. Sidewalk Bridge and Scaffolding: All materials used for the standing scaffolding and sidewalk bridging shall be of a corrosion-resistant, non-rusting composition or shall be installed freshly painted with rust-inhibitive paint and well-maintained. All materials shall

be weatherproof, of the same color and capable of withstanding years of service without deteriorating. All scaffolding shall be maintained in an operational state at all times.

B. Accessories: All scaffolding and bridging accessories, including but not limited to, any devices for fastening the scaffolding and hoists to the building, shall be corrosion-resistant. Any of these items which cannot be painted shall be of a non-corrosive material. This includes tie wires, spacers, etc.

C. Platforms: All access platforms shall be securely attached to the scaffolding system and must provide a level surface. Platforms must be able to support storage of 50 lbs. per square foot minimum. Required support systems to be determined by scaffold installer's engineer.

D. Scaffold Stair: Scaffold stair to be "WACO Wedge Lok" Access Stair system or approved equal.

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. Contractor shall provide all labor and materials necessary for the complete execution of the items listed below.

B. Scaffolding shall be as visually pleasing as possible and shall not obstruct windows. If possible, install vertical frames and planking to coincide with column locations and floor lines. Color and design shall be approved by the Owner and Architect.

3.02 DESCRIPTION OF WORK

A. Sidewalk Bridging: Sidewalk bridging shall be provided where necessary to protect the public during the construction process. Configuration of bridge must be coordinated with the proposed scaffolding system.

1. Height. As necessary to provide unobstructed access to building entryways. Foam padding to adequately protect granite ashlar and ornament shall be installed between bridging and building facade.

2. Width. The legs of the sidewalk bridge shall be arranged to allow for the passage of pedestrians and vehicles where necessary. Legs shall extend the full width of the sidewalk. All scaffolding legs shall be protected against vehicle displacement or impact damage.

3. Length. All sidewalk bridging shall extend at least twenty feet beyond the ends of all faces of the building structure.

4. If weight distribution, grillage, mats, etc. are used in areas of sidewalk bridge, this grillage shall not exceed fourteen inches (14") in height, including marine grade plywood (5/8") for walk-ways. The 15'-0" clear area is to be measured from the walking surface. Differences in elevation are to be provided with ramps at a maximum slope of 1 to 4. Ramps shall have cleats to prevent slipping.

5. Bridge Design and Calculations. Bridge design and calculations to be under supervision of and stamped by Rhode Island Registered Professional Engineer shall be submitted for approval to all agencies having jurisdiction.

   a. Bridging shall be cross braced lengthwise and sideways

   b. Shoring shall be provided only if absolutely necessary. All shoring shall be designed by Professional Engineer retained by the Contractor. Coordinate with the Owner and Architect.

6. Overhead Protection. All sidewalk bridging shall be designed to provide overhead protection against rain and shall be properly pitched towards the exterior side. All sidewalk bridging decking shall extend beyond the bridge flush to the face of the building at all locations.

7. Parapet. All sidewalk bridging parapet panels shall be at least 4-0″ high and of exterior grade plywood and shall be painted in a color selected by Architect.

8. Lighting. Lighting shall be four lamps, 4′-0″ florescent fixtures with vandal-proof enclosures, 6′-0″ apart running east to west and shall be installed in conformance with all building codes.

9. Signage

   a. Contractor is responsible for installing any signs supplied by Owner.

   b. Any additional signs required by agencies having jurisdiction shall be furnished and installed by the Contractor.

   c. Additional signage shall be furnished and installed by the Contractor. Signs shall include names, addresses and telephone numbers of Contractor and Architect as well as reference numbers for NYC Building Department. Lettering shall be at least 3″ high.

B. Scaffolding. Fixed scaffolding shall be installed in phases around entire perimeter of house from grade to roof level, with shoring and/or support system as required. Scaffolding system shall be capable of providing access to building and work platforms. Plank full width of frames tight to the building face at each floor level and the roof level. Provide two plank outriggers and planking where/as necessary to perform the work of this contract.

   1. The allowable loading at the perimeter of the house to be determined by the scaffold installer's engineers. All scaffolding systems shall be designed to distribute the weight of the scaffolding not to exceed this limitation, taking into account all possible loads including pedestrian traffic.

   2. Scaffolding to be designed so that a hoist machine and/or chain falls can be rigged so as to be capable of lifting bags of cement or sand, wet mortar or other normal masonry construction materials.

   3. At grade level, bases shall be developed for spreading and distributing loads as necessary to meet load limitations. The design of these load spreading bases shall by necessity be tailored to suit the specific configuration of the proposed scaffolding scheme.

4. All scaffolding bases necessary shall be designed so as not to obstruct the flow of pedestrian traffic. The load spreading bases shall be designed by the sidewalk installer's engineer and submitted for approval to the Architect.

5. Contractor to adequately protect building from impact damage from scaffolding. All pipe ends and planking shall be covered with foam padding at surfaces adjacent to the building.

C. Scaffold Tying: The scaffolding shall be tied back to the building as required by all applicable laws and codes. No damage to existing building will be permitted. Do not allow scaffolding, sidewalk bridging or subsidiary elements to touch the facade except for approved anchoring system.

1. Scaffold shall be stabilized through to the building's interior or by alternate method to be approved by Architect. Provide weatherproof enclosures at all penetrations. Contractor to submit tie back plan to be approved by Architect.

D. Platforms: Platforms providing circulation through the scaffolding frames shall be installed at every floor level and at the roof level. Work platforms will be required for every level. If load requirements do not allow for simultaneous access of all levels, coordinate with sequencing of the work to be performed.

1. All platforms to be constructed of wood or metal planking as per OSHA's requirements and as per code mandated loads and shall include toe boards.

2. Provide levels of moveable work platforms two planks wide on projecting brackets towards the building from the scaffold so as to reach to the face of the building at all work areas.

3. Provide platforms to facilitate access to work areas at every level of scaffolding.

E. Staircase**:** Staircase at the scaffolding shall be installed to provide personnel access with stair landings at roof and platform levels. Staircase shall be located so as not to impede the passage of personnel and material on the scaffold platforms. Staircase shall be installed from the bridge to the roof level of the building.

1. Stairs shall be a minimum of 3 ft. wide, treads 8" minimum (excluding nosing), risers 8" maximum height.

2. It shall be the Contractor's responsibility to insure that the stair tower remains secured from public access for the duration of the project.

3.03 GUARANTEE

A. The Contractor guarantees to replace any defective materials and to correct any poor workmanship for all work covered by this section.

END OF SECTION 01500

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 01210 - Allowances.
2. Section 01230 - Alternates.
3. Section 01250 - Substitution Procedures.
4. Section 01420 - References.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 01330 - Submittal Procedures.
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01330 - Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a

product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01730 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 01100 - Summary of Work.
2. Section 01330 - Submittal Procedures.
3. Section 01770 - Closeout Procedures.
4. Section 02070 - Selective Demolition.
5. Section 07840 - Penetration Firestopping.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor and/or professional engineer certifying that location and elevation of improvements comply with requirements.

B. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Fire-detection and -alarm systems.
    i. Conveying systems.

j. Electrical wiring systems.
k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Construction Layout Conference: Before proceeding with partition installation, meet at Project site to review layout. Installer will present any discrepancies discovered during layout. Installation may proceed only after Architect's review and approval.

E. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. 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 Owner 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 caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect

3.4 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 90 inches in occupied spaces and 84 inches in unoccupied spaces.

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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

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

G. 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.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

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.

I. 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.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 – Summary of Work.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. 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 waste materials more than seven days during normal weather or three 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.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

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: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

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.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

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: Comply with qualification requirements in Section 01400 - Quality Requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01730

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Recycling nonhazardous demolition and construction waste.
2. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 02070 - Selective Demolition.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:

   a. Paving.
   b. Concrete.
   c. Concrete reinforcing steel.
   d. Brick.
   e. Concrete masonry units.
   f. Stone.
   g. Wood studs.
   h. Wood joists.
   i. Wood paneling.
   j. Wood trim.
   k. Structural and miscellaneous steel.
   l. Rough hardware.
   m. Roofing.
   n. Insulation.
   o. Doors and frames.
   p. Door hardware.
   q. Windows.
   r. Glazing.
   s. Metal studs.
   t. Gypsum board.
   u. Acoustical tile and panels.
   v. Carpet.
   w. Carpet pad.
   x. Demountable partitions.
   y. Equipment.
   z. Cabinets.
   aa. Plumbing fixtures.
   bb. Piping.
   cc. Supports and hangers.
   dd. Valves.
   ee. Sprinklers.
   ff. Mechanical equipment.
   gg. Refrigerants.
   hh. Electrical conduit.
   ii. Copper wiring.
   jj. Lighting fixtures.
   kk. Lamps.
   ll. Ballasts.
   mm. Electrical devices.

nn. Switchgear and panelboards.
oo. Transformers.

2. Construction Waste:

a. Masonry and CMU.
b. Lumber.
c. Wood sheet materials.
d. Wood trim.
e. Metals.
f. Roofing.
g. Insulation.
h. Carpet and pad.
i. Gypsum board.
j. Piping.
k. Electrical conduit.
l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons
4. Quantity of waste salvaged, both estimated and actual in tons
5. Quantity of waste recycled, both estimated and actual in tons
6. Total quantity of waste recovered (salvaged plus recycled) in tons
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01310 - Project Management and Coordination. Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

    1. Pulverize masonry to maximum 4-inch size.

    2. Clean and stack undamaged, whole masonry units on wood pallets.

C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

D. Metals: Separate metals by type.

    1. Structural Steel: Stack members according to size, type of member, and length.
    2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

E. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

G. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

H. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

I. Conduit: Reduce conduit to straight lengths and store by type and size.

3.4 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.6 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-2 for demolition waste identification.

C. Form CWM-3 for construction waste reduction work plan.

D. Form CWM-4 for demolition waste reduction work plan.

E. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

F. Form CWM-6 cost/revenue analysis of demolition waste reduction work plan.

G. Form CWM-7 for construction waste

H. Form CWM-8 for demolition waste.

END OF SECTION 01741

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 01323 - Photographic Documentation.
2. Section 01730 - Execution.
3. Section 01782 - Operation and Maintenance Data.
4. Section 01783 - Project Record Documents.
5. Section 01790 - Demonstration and Training.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

3. Submit list of incomplete items in the following format:

    a. MS Excel electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning at the end of each construction phase. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls" and Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01770

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 01330 - Submittal Procedures.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 15 days before commencing demonstration and training.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

SECTION 01783 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 01730 - Execution.
2. Section 01770 - Closeout Procedures.
3. Section 01782 - Operation and Maintenance Data.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Submit three paper copies and PDF electronic files of scanned record prints of Project's Drawings, including addenda and contract modifications.

a. Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

    a. See Section 01330 - Submittal Procedures.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file and paper copy.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file and paper copy.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01783

SECTION 01790 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

B. Unit Price for Instruction Time: Length of instruction time will be measured by actual time spent performing demonstration and training in required location. No payment will be made for time spent assembling educational materials, setting up, or cleaning up.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor and videographer.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

    a. Name of Project.
    b. Name and address of videographer.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01400 - Quality Requirements, experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01310 - Project Management and Coordination. Review methods and procedures related to demonstration and training including, but not limited to, the following:

    1. Inspect and discuss locations and other facilities required for instruction.
    2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
    3. Review required content of instruction.
    4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. 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. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.

1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Pre produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01790

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01. RELATED DOCUMENTS

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

1.02. SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of buildings interior including but not limited to structure, components, walls and floors, finishes and fixtures, piping and wiring.

2. Existing ADA ramp, landings and railings and sidewalk

3. Salvage of existing historic items to be reused or recycled.

B. Related Requirements:

1. Section 04500 – Masonry Restoration
2. Section 05720 – Metalwork
3. Section 06200 – Architectural Woodwork
4. Section 09230 – Gypsum Plastering

1.03. DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Client.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04. SPECIAL CONDITIONS

A. **HAZMAT Abatement:** Existing building materials and components contain lead and asbestos materials. All HAZMAT abatement is the Contractor's responsibility. The Contractor shall

comply with all current regulations per all/any agencies having jurisdiction in the proper testing, removal and disposal of all/any asbestos and lead containing materials as part of the Base Bid.

1.05. MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Client that may be uncovered during demolition remain the property of Client.

1. Carefully salvage in a manner to prevent damage and promptly return to Client.

1.06. PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project Site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.07. INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Clients's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of existing roadways, pathways and stairs.
5. Coordination of Clients continuing occupancy of portions of existing building and of Clients partial occupancy of completed Work.

C. Inventory: Submit a list of items to be removed and salvaged and deliver to Client prior to start of demolition.

D. Pre-demolition Photographs or Video: Submit before Work begins.

E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.08. CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.09. QUALITY ASSURANCE

A. Demolition Qualifications: Engage a experienced firm or crew that has successfully completed demolition work on historic buildings similar to that indicated for this project.

B. Regulatory Requirement: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.010. FIELD CONDITIONS

A. The Client will occupy portions of the site; conduct selective demolition so Client's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Client as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Client and/or Owner before start of the Work.
   a.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Client. Hazardous materials will be removed by Client/and or under a separate contract.

E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas and openings, including temporary protection.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.01 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

D. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or preconstruction videotapes.

   a.

   2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
   3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Client and/or Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, HVAC systems, equipment, and components and existing wiring and electrical system components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Client.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.04 ASBESTOS CONTAINING MATERIAL

A. Contractor shall comply with all current regulations as per all/any agencies having jurisdiction in the proper removal and disposal of any/all asbestos and lead containing materials.

3.05 SELECTIVE DEMOLITION, GENERAL

B. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

C. Work in Historic Areas: In historic areas or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling".

D. Reuse of Building Elements: Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

E. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Client.
4. Transport items to Client storage area on-site or off-site designated by Client.
5. Protect items from damage during transport and storage.

F. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

G. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

B. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Client's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Client/Owner's property and legally dispose of them.

3.08 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.09 SELECTIVE DEMOLITION SCHEDULE

A. Existing to Be Removed:
   1. Existing ADA ramp, landings and railings
   2. Existing plywood infill pigeon protection at all window and north entrance door pediments
   3. Existing elevator, structure and pit
   4. Interior walls where indicated on the drawings
   5. Interior plaster and framing where indicated
   6. Existing dropped acoustical tile ceilings and applied acoustical ceilings and supports
   7. Existing main entrance doors
   8. Interior wooden blocking, shelves and trim as indicated
   9. Any deteriorated wooden trim
   10. All other items indicated on the drawings
   11. Any other items that are not indicated on the drawings and specifications, but required to complete the demolition work.

B. Existing Items to Be Removed and Salvaged:
   1. All other items indicated on the drawings

C. Existing Items to Be Removed and Reinstalled:
   1. All other items indicated on the drawings

D. Existing Items to Remain:
   1. All items indicated on the drawings

END OF SECTION 02070

SECTION 03300 - CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SUMMARY

A. Briefly, and without force and effect upon contract documents, work of this section can be summarized as follows:

1. New cast-in-place concrete ramp and landing at main entrance to provide ADA access as shown on the drawings.
2. Install cast-in-place concrete floor at location of removed elevator at the first floor level
3. Install new cast-in-place concrete floor at the location of the new first floor toilet room, electrical closet and elevator lobby where show on the drawings.
4. Install cast-in-place concrete floor at new elevator pit and where and where indicated on the drawings.

B. Work of this section includes all labor, materials, equipment and services necessary to complete the concrete work as shown on the drawings and specified herein, including, but not limited to the following:

1. Preparation of subgrade for new on-grade concrete slabs.
2. Furnishing and installing all required cast-in-place concrete including formwork, reinforcement, concrete materials, anchors and inserts.
3. Placing in the forms all inserts, anchors, anchor bolts, bearing plates and the like furnished by other trades for casting into the concrete and cleaning of same after stripping of forms.
4. Supply, fabricate and place all required reinforcing bars, mesh and other reinforcement for concrete where shown, called for, and/or required complete with proper supporting devices.
5. Finishing of all concrete work.
6. Curing and protection of all concrete and cement work.
7. All other work and materials as may be reasonably inferred and needed to make the work of this section complete.

1.3 RELATED WORK

A. Section 02070 – Selective Demolition
B. Section 04400 – Masonry Restoration
C. Section 05310 – Steel Decking
D. Section 05720 - Metalwork

1.4 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork

E. Shoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing.

1.5 QUALITY ASSURANCE

A. Qualifications: Work must be performed by a firm having not less than 5 years successful experience in comparable concrete projects and employing personnel skilled in the processes and operations indicated.

B. In acceptance or rejection of work, no allowance will be made for lack of skill or competence on the part of the workers.

C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

D. Regulatory Requirements: Work of this section shall be carried out in accordance with all applicable Federal, State and Local codes and requirements of other agencies having jurisdiction. In all cases the more restrictive limitation of any applicable requirements shall be followed.

E. Source of Materials: Obtain materials for this Work from a single source and batch for each type of material required to ensure match of quality. Architect shall reject any material that does not meet his criteria.

F. Except as modified by the NYS Building Code and Contract Documents, comply with the applicable provisions and recommendations of the following codes and standards:

1. ACI 301, "Specifications for Structural Concrete for Buildings", with changes to paragraphs as follows:
   a. (3.71): The use of admixtures containing calcium chloride shall not be permitted.
   b. (8.3.4): All concrete shall be consolidated using mechanical vibrators.
2. ACI 214, "Recommended Practice for Evaluation of Compression Test Results of Field Concrete."
3. ACI 311, "Recommended Practice for Concrete Inspections".
4. ACI 318, "Building Code Requirements for Reinforced Concrete".

5. ACI 347, "Recommended Practice for Concrete Formwork".
6. ACI 211.1, "Recommended Practice for Selecting Proportions for Normal Concrete".
7. ACI 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
8. CRSI-WCRSI, "Placing Reinforcing Bars".
9. AWS D1.4, "Structural Welding Code Reinforcing Steel".
10. The ACI Field Reference Manual, SP-15 shall be kept at the job site, and the practices set forth therein shall be strictly adhered to.

PART 2 - PRODUCTS

2.1 CONCRETE CONSTITUENTS

A. Cement, ASTM C-150, type I or II, use one brand only for each type of cement used throughout the project.

B. Normal Weight Fine Aggregate: washed, inert, natural or manufactured or combination thereof, sand conforming ASTM C33 gradation.

C. Normal Weight Coarse Aggregate: well graded crushed stone or washed gravel conforming to ASTM C33, sizes 57 for foundations and 67 for slabs and structure.

D. Lightweight Coarse Aggregate: well graded crushed expanded shale produced by rotary kiln method; Solite or equal, conforming to ASTM C330.

E. Water: Potable, clean and free from oils, acids, alkali, organic matter and other deleterious material.

F. Admixtures:

1. Water-reducing agents: "WRDA"/W.R.Grace & Co.; "Pozzolith 200N" Master Builders Co.; "PDA25"/ Protex Industries; or approved equal conforming to ASTM C-494.
2. Air-entrainment: "DAREX AEA"/W.R.Grace; "MB-VR"/Master Builders; "PROTEX AEA"/Protex or approved equal conforming to ASTM C-260.
3. Admixtures retarding setting of cement in concrete shall not be used without written approval of architect.
4. Admixtures causing accelerated setting of cement in concrete shall not be used.
5. Admixtures containing calcium chloride or other chloride salts shall not be used.

2.2 FORM MATERIALS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

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.

C. Chamfer strips: 1/2 inch 45 degree wood or "PVC" installed at all corners, inside and out of all

forms unless otherwise directed by Architect.

D. Form ties and spreaders: prefabricated assemblies by Richmond; Superior, Dayton or approved equal. Wire ties SHALL NOT BE USED. Ties for foundation work shall be of snap design with removal cones and water seal washer.

2.3 REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60 and deformations ASTM A305.

B. Welded Wire Fabric: ASTM A185.

C. Accessories: Product Standard PS7-766, Class C Accessories touching exposed formed surfaces shall be plastic tipped and/or otherwise isolated.

2.4 MISCELLANEOUS MATERIALS

A. Grout: Pre-mixed, non-shrink, non-metallic, Five Star by U.S. Grout Co. or equal.

B. Waterstops: extruded "PVC"; 2,000 psi minimum tensile strength; 350% minimum elongational Shore "A" hardness, 65 to 75: maximum 0.15% water absorption; inert; as manufactured by Progress Unlimited.

C. Vapor Barrier: 10 mil polyethylene.

D. Expansion Joint Filler: ASTM D1751.

PART 3 - EXECUTION

3.1 GENERAL

A. Job Conditions:

1. Traffic Control: Maintain access for pedestrian traffic and as required for construction activities.
2. Provide barricades and warning signs as required.

B. Inspection:

1. Examination of Substrata: Examine the substrata of the areas and ascertain the conditions under which new concrete paving is to be installed. Do not proceed until unsatisfactory conditions, if any, have been corrected.

C. Subgrade Preparation:

1. Grade/prepare to smooth parallel to finish grade and to proper elevation. No humps or hollows allowed. Roll or tamp until proper compaction, minimum of 95% of maximum density, is obtained.

2. Remove soft and yielding materials which will not compact readily rolled to tamped. Replace with crushed stone, gravel or other approved materials. Tamp, ram or roll until level with adjacent grade.
3. Check elevations and position of all existing utility structures, valves, etc., that will lie within areas to receive new concrete slabs and walks. Make or have made any adjustments required to properly line up/set these elements with regard to the finish work.

3.2 CRUSHED STONE BASE COURSE

A. Materials: Stone - Broken stone shall consist of clean crushed rock 1-1/2 inches maximum size and not more than 5% passing a No. 4 sieve. Mixture shall contain no earth, soil or clay.

B. Installation: Spread, shape, wet and compact broken stone base course below paving. Compact to 92% of maximum density at optimum moisture content. Thickness of compacted base course shall be 6" typically.

3.3 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class B, 1/4 inch
2. Class C, 1/2 inch

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

F. Install keyways, reglets, recesses, and the like, for easy removal.

G. Do not use rust-stained steel form-facing material.

H. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

I. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

J. Do not chamfer exterior corners and edges of permanently exposed concrete.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

L. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

M. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

N. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.4 CONCRETE MATERIAL AND PLACEMENT

A. Concrete shall develop the minimum compressive strengths shown on drawings at 28 days when sampled and tested in accordance with ASTM C31 and C39 with a design slump of 5 inches.

B. All laboratory costs connected with establishing a design mix, satisfactory to the Architect/Owner, shall be borne entirely by the Contractor.

C. Ready-mix concrete shall comply with the requirements of ASTM C94 and ACI 614. All plant and transporting equipment shall comply with the concrete plant standards and truck mixer and agitator standards of the National Ready Mix Concrete Association.

D. Notify architect and testing organization at least 36 hours (1 1/2 regular working days) before each pour so that forms and reinforcing may be examined. Do not place concrete until inspection has been made or waived.

E. Do not place concrete in water or on snow, ice or frozen or water softened ground.

F. When concrete is placed at or below a temperature of 40 degrees Fahrenheit or when this temperature is likely to occur within 24 hours of placement, protect in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting".

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS AND EMBEDDED ITEMS

A. Locate construction joints as detailed at approved locations. Make construction joints with straight stops and continuous keys. Reinforcement shall be continuous through construction joints unless otherwise indicated.

B. Install embedded items accurately in position conforming to approved shop drawings

C. Score (weakened plan/contraction) Joints: Provide score joints, sectioning concrete into areas as shown on the Drawings. Construct joints to a depth equal to at least 1/4 concrete thickness as follows:

1. Tooled Joints: Form score joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
2. Construction Joints: Place construction joints at the end of all pours and at locations where placement operations are stopped for a period of more than 1/2 hour except where such pours terminate at expansion joints. Finish joint edges to match score joint finish.

3.7 EXPANSION JOINTS

A. Locate expansion joints at 16' o.c. or as detailed.

B. Extend Joint Fillers:

1. Full width and depth of joint, and not less than 1/2" or more than 1" below finished surface. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Form top edge of filler to conform to top profile of concrete.
2. Set non-extruding, bituminous type preformed joint fillers where shown, abutting new curbs, existing and new structures, walls and other fixed objects. Combine, when and where applicable, with preformed waterstops. Filler shall be stopped 1/2" below top of slab and filled with pourable sealant compound compatible with filler and non-staining in nature.

E. Protect the top edge of joint filler during concrete placement with wood strip metal cap or other temporary material. Remove protection after both sides of joint are placed.

F. Filler and Sealants: Provide and install joint fillers and sealants to cover expansion joints. Comply with the applicable requirements of Section 07900 of the Specifications for preparation of joint materials, installation, and performance, and as herein specified.

3.8 FINISHING AND CURING

A. Finishing Formed Surface: Rough-formed finish applied to concrete surfaces not exposed to public view. As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed surface irregularities.

B. Finishing Slabs-On-Grade:

1. 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.
c. Apply a 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.

C. Curing:

1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

2. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

3. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

a. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials: Water, Continuous water-fog spray, Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

b. Membrane Forming Curing Compound per ASTM C308, Type 1.

END OF SECTION 03300

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Perform the work of this Section in accordance with the General Conditions, AIA Document A201/1987, Supplementary Conditions, and all other requirements of the Contract Documents.

1.2 WORK INCLUDED

A. Except as otherwise noted, the work under this Section includes all labor, materials, equipment and appliances necessary for the complete execution of all Masonry Work in accordance with the Contract.

B. Without restricting the generality of the foregoing, the following items of work are included:

1. Constructing interior brick and block masonry wall construction shown on the drawings.
2. Hollow and solid concrete block masonry work of thickness and strengths as shown on the drawings including horizontal joint reinforcing.
3. Mortar bed and grouting of all window and door frames as shown on drawings.
4. All mortar and grout required for all masonry and for items which are specified to be set under this Division.
5. Furnishing and setting all ties and anchors required for securing all masonry work together and to adjacent work.
6. Constructing control joints in masonry walls as required.
7. Miscellaneous items of brick, special shape brick, block, glazed block and other masonry as shown on the drawings.
8. Installing items of other Divisions and Contracts, including, bit not limited to: loose lintels, bearing plates, and other miscellaneous items as required.
9. Cutting and patching of masonry work required for the work of other trades during wall construction.
10. Furnishing and installing vertical reinforcing bars which are totally buried within the masonry wall. Furnishing and installing horizontal reinforcing within walls and ends of floor including grout.

1.3 RELATED SECTIONS:

The following sections contain requirements that relate to this Section:

A. Section 04500 – Masonry Restoration.

B. Elevator Specification Sections.

1.4 APPLICABLE CODES AND SPECIFICATIONS

A. Masonry work shall comply with the local Building Code and Building Department directives and with the following codes, standards and specifications:

1. Specification for the Design and Construction of Load-Bearing Concrete Masonry≅ of the National Concrete Masonry Association.
2. ASTM A476 - Mortar and Grout for Reinforced Masonry.
3. ASTM A615 - Standard Spec. For Deformed Billet-Steel Bars for Concrete Reinforcement.
4. ASTM C55 - Standard Specifications for Concrete Building Brick.
5. ASTM C90 - Standard Specifications for Hollow Load-Bearing Concrete Masonry Units.
6. ASTM C91 - Standard Specifications for Masonry Cement.
7. ASTM C144 - Standard Specifications for Aggregate for Masonry Mortar.
8. ASTM C145 - Standard Specifications for Solid Load-Bearing Concrete Masonry Units.
9. ASTM C150 - Standard Specifications for Portland Cement.
10. ASTM C207- Standard Specifications for Hydrated Lime for Masonry Purposes.
11. ASTM C216 - Standard Specifications for Facing Brick.
12. ASTM C270 - Standard Specifications for Mortar for Unit Masonry.
13. ASTM C404 - Standard Specifications for Aggregates for Masonry Grout.
14. ASTM C426 - Standard Method of Test for Drying Shrinkage of Concrete Block.
15. ASTM C476 - Standard Specifications for Mortar and Grout for Reinforced Masonry.
16. ASTM C62 - Building Brick

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contact and Division 1 Specification Sections.

B. Product data for each different masonry unit, accessory, and other manufactured product indicated.

C. Show drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 ADetails and Detailing of Concrete Reinforcing≅ showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.

D. Samples for initial selection purposes of the following:

1. Unit masonry samples in small-scale form showing full extent of colors and textures available for each different exposed masonry unit required.
2. Colored masonry mortar samples showing full extent of colors available.

E. Samples for verification purposes of the following:

1. Full-size units for each different exposed masonry unit required showing full range of exposed color, texture, and dimensions to be expected in completed construction.
    a. Include size variation data verifying that actual range of sizes for brick falls within ASTM C216 dimension tolerances for brick where modular dimensioning is indicated.

F. Material certificates for the following signed by manufacturer and Contractor certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout including name of manufacturer, brand type and weight slips at time of delivery.
2. Aggregate used for concrete masonry units.
3. Each material and grade indicated for reinforcing bars.
4. Each type and size of joint reinforcement.
5. Each type and size of anchors, ties, and metal accessories.

G. Material test reports from a qualified independent testing laboratory employed and paid by Owner indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:

1. Well in advance of beginning masonry work, the testing laboratory shall test materials and masonry units as specified in this Paragraph and elsewhere in these specifications.
2. Tests for materials proposed for use shall be as per ASTM Specifications.
3. During construction samples of each size and strength of block, of brick and of grout and mortar shall be tested. These samples shall be taken from those delivered and used for each floor. The tests shall be made as required to show that items tested comply with these specifications and applicable ASTM Specifications listed elsewhere.
4. Mortar complying with property requirements of ASTM C270.
5. Masonry unit, to include density, aggregate type and shrinkage values.
6. Three (3) masonry test prisms for each 5000 square feet or each story for each type of block and for each type of wall construction indicated. Masonry test prisms will be tested in accordance to ASTM E447-92. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

H. Cold-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.

I. Hot-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.

1.6 QUALITY ASSURANCE

A. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM

E119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

B. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

C. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

D. Field-Constructed Mock-Ups: Prior to installation of unit masonry, erect sample wall panels to further verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work:

1. Locate mock-ups on site in locations indicated, or if not indicated, as directed by Architect at ground level.
2. Build mock-ups for the following types of masonry in sizes indicated, full thickness, including face and backup widths as well as accessories.
    a. Typical block shaft wall, approximately 4'x4'.
3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
4. Protect mock-ups from the elements with weather-resistant membrane.
5. Retain and maintain mock-ups during construction in undisturbed condition as standard for judging completed unit masonry construction.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials to project in undamaged conditions.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in air-dried conditions.

C. Store cementitious materials off the ground, under cover and in a dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at the end of each days work. Cover partially completed masonry when construction is not in progress.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar and soil that comes in contact with such masonry..

C. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:

1. Do not lay masonry units that are wet or frozen.
2. Remove masonry damaged by freezing conditions.

D. Hot-Weather Construction: Comply with referenced unit masonry standard.

1.9 WARRANTY

A. Warranty: Submit a written warranty executed by the Contractor, agreeing to repair or replace masonry walls that fail in material or workmanship within the specified warranty period.

B. Warranty Period: One (1) year after date of execution of the warranty.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 CLAY MASONRY UNITS

A. General: Comply with the following requirements applicable to each form of brick required:

1. Provide special molded shapes where indicated and as follows:
   a. For applications requiring brick of form, color, texture and size on exposed surfaces that cannot be produced by sawing standard brick sizes.
   b. For applications where stretcher units cannot accommodate special conditions including those at corners, movement joints, bond beams and lintels.
2. Provide units without cores or frogs and with all exposed surfaces finished for ends of sills, caps and similar applications that expose brick surfaces that otherwise would be concealed from view.

B. Face Brick Econo: ASTM C216 and as follows:

1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:
   a. Grade SW
2. Type FBS (for general use in exposed masonry requiring minimum variations in size and color ranges).
3. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C216:
   a. To be selected by the Architect.
4. Application: Use where brick is exposed, unless otherwise indicated.
5. Products:
   a. To be selected by the Architect.

C. Building (Econo) Brick: ASTM C62, and as follows:
1. Grade and Unit Compressive Strength: Provide units of grade indicated below:
   a. Grade SW.
2. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C216:
   a. Match size specified for face brick.
3. Application: Use where brick is indicated for concealed locations.

2.3 CONCRETE MASONRY UNITS

A. General: Comply with requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide special shapes where indicated and as follows:
   a. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
   b. Square-edged units for outside corners.
2. Size: Provide concrete masonry units complying with requirements indicated below for sizes that are manufactured to specified face dimensions within tolerances specified in the applicable referenced ASTM specification for concrete masonry units..
   a. Concrete Masonry Units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings.
3. Provide Type I, moisture-controlled units.
4. Exposed Faces: Manufacturer=s standard color and texture, unless otherwise indicated.
5. Surfaces Textures pursuant to ASTM standards:
   a. Rough: Surfaces of units which are to be concealed may be rough finished.
   b. Smooth: Surfaces of units which are to be exposed to public view shall be smooth, even textured, free from chips, cracks, or other imperfections.

6. The Owner shall retain a testing laboratory to make tests and reports on concrete blocks before and during construction as specified elsewhere in these specifications.

B. Hollow Load-Bearing Concrete Masonry Units; ASTM C90, Grade N-1 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated on structural drawings.
2. Weight Classification: Normal weight.
3. Shrinkage: The shrinkage of the concrete units shall not exceed 0.065% when tested in accordance with ASTM C-426.

C. Solid Load-Bearing Concrete Masonry Units: ASTM C145, Grade N-1 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below on structural drawings.
2. Weight Classification; Normal weight.
3. Provide 4 inches solid thick, 2-hour rated concrete masonry unit with pumice aggregate where indicated on drawings.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold - weather construction. Provide natural color.

B. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C1142.

C. Hydrated Lime; ASTM C207, Type S.

D. Aggregate for Mortar: ASTM C144, except for joints less than 1/4 inch, use aggregate graded with 100% passing the No. 16 sieve.

E. Aggregate for Grout: ASTM C404.

F. Color Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

G. Water: Clean and potable.

2.5 REINFORCING STEEL

A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article.

B. Steel Reinforcing Bars: Material and grade as follows:

1. Billet steel complying with ASTM A615.
2. Grade 60.

C. Deformed Reinforcing Wire: ASTM A496.

D. Plain Welded Wire Fabric: ASTM A185.

E. Deformed Welded Wire Fabric: ASTM A497.

2.6 JOINT REINFORCEMENT

A. General: Provide joint reinforcement complying with requirements of referenced unit masonry standard and this article, formed from the following:

1. Galvanized carbon steel wire, coating class as required by referenced unit masonry standard for application indicated.

B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight length of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry wall bed joints shall be reinforced with heavy duty truss type reinforcement, conforming to ASTM 82 for cold drawn steel wire. Two deformed longitudinal side rods shall be welded to a continuous diagonal cross rod forming a truss design. The finish shall be mill galvanized in accordance with ASTM A116 Class I.

D. Prefabricated corners and tees shall be used at all corners and wall intersections.

E. Horizontal joints in reinforcement shall be lapped 6".

F. Reinforcement shall be installed in every second block course unless shown on drawings.

G. Provide and install vertical reinforcing bars in masonry walls as shown. Bars are to be placed in block voids and voids filled with grout.

H. Manufacturers: Subject to compliance with requirements, provide joint reinforcement by one of the following:

1. Dur-O-Wal, Inc.
2. Heckman Building Products, Inc.
3. Hohmann & Barnard, Inc.
4. Masonry Reinforcing Corp. Of America

2.7 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of referenced unit masonry standard and of this article.

B. Galvanized Carbon Steel Wire: ASTM A82, coating class as required by referenced unit masonry standard for application indicated.

1. Wire Diameter: 0.25 inch.

C. Galvanized Steel Sheet: ASTM A366 (commercial quality) cold-rolled carbon steel sheet, hot-dip galvanized after fabrication to comply with ASTM A525, Class B2 (for unit lengths over 15 inches) and Class B3 (for unit lengths under 15 inches), for sheet metal ties and anchors.

1. Galvanized Steel Sheet Thickness: For steel sheet hot-dip galvanized by continuous process prior to fabrication:

a. 0.1084 inc. (12 gage).

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dur-O-Wal, Inc.
2. Heckman Building Products, Inc.
3. Hohmann & Barnard, Inc.
4. R.K.L. Building Specialties, Inc.

2.8 EMBEDDED FLASHING MATERIALS

A. Uncured Neoprene Flashing: Manufacturer=s flashing product consisting of 60-mil-thick pliable sheet neoprene with accessories as required.

B. Manufacturer: Subject to compliance with requirements, provide product of the following:

1. Emseal Elastomeric Flashing by Emseal Joint Systems, LTD.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Nonmetallic Expansion Joint Strips: Premolded filler strips complying with ASTM D1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from the following material:

1. Neoprene

B. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D226, Type I (No. 15 asphalt felt).

2.10 MASONRY CLEANERS

A. See Section 04510 – Masonry Cleaning.

2.11 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agent, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Mortar for Unit Masonry:

1. Mortar shall comply with ASTM Designation C-270, latest edition, Type M or S (see structural drawings) for all masonry in masonry walls and partitions and in accordance with Code requirements.
2. Mortar for exposed brickwork shall be colored to match the face brick.
3. The testing laboratory shall prepare 3 test cubes of mortar used for each day=s work, in accordance with ASTM C-91.
4. Compressive strength at the end of 28 days of cubes tested shall not be less than 1800 psi for Type S mortar and 2,500 psi for Type M mortar.

C. Grout for Unit Masonry:

1. Grout shall comply with ASTM Designation C476.
2. Grout shall have an ultimate compressive strength when tested at age 28 days of 4,000 psi.
3. Grout shall have a minimum slump of 8".
4. Contractor shall submit his proposed grout mix to the Architect for approval complete with supporting data including cylinder tests using his proposed mix and materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Do not proceed until satisfactory conditions have been corrected.

3.2 LAYING BRICK AND BLOCK WALLS

A. Lay all facing masonry plumb, true to line, with level and accurately spaced courses. Break each course joint with joint below unless otherwise shown. Keep bond plumb throughout. Lay corners and reveals plumb and true. A story pole marked with all courses and adjusted as necessary to work with heads and sills of openings shall be

used to maintain some jointing for all surfaces of building. Maintain alignment of head joints by plumb lines. Maximum tolerance allowable for alignment of head joints shall be such that when plumb line is dropped from top to bottom of entire surface, the line shall show within the width of every head joint in any line of joints.

B. Joints in masonry that will be concealed shall be cut off flush.

C. Exterior joints below grade shall be trowel pointed. The bond of the brick facing shall be laid, cut and adjusted for each space between openings in walls so that no closure will be required at jambs or external angles.

D. Where fresh masonry joins masonry that is partially set or totally set, clean and lightly wet exposed surface of set masonry. Remove all loose brick and masonry. If it becomes necessary to stop off a horizontal run of brick or block masonry, execute only by racking back one-half brick or block length in each course. Toothing will not be permitted except upon written approval of the Architect.

E. Vertical longitudinal or collar joints in the composite, multi-wythe walls shall be completely filled by parging either face of backing or back of facing or by pouring vertical joint full of fine grout.

F. Full mortar bed shall be used when laying the first course of both solid or hollow block on the foundation wall.

G. All solid block shall be full mortar bedded. Hollow units, except as noted above, may be shell mortar bedded. Deep furrowing of bed joints shall not be done; however, light furrowing or riffing the bed joint with the point of the trowel is permitted. Units shall be shoved in place with a downward and forward motion to produce a tight joint.

H. Mortar should not be spread so far ahead of brick and block being laid that it becomes stiff and loses its plasticity. Masonry units must be set in soft plastic mortar to get proper embedment and bond.

I. When mortar has become stiff enough to resist the pressure of a thumb, it should be tooled (jointed). Tooling shall provide a concave mortar joint. Joints in Exposed to view painted block walls shall be tooled slightly concave with the mortar thoroughly compacted against the edges of the units. Tooled joints shall be finished to uniformly straight and true lines and surfaces, smooth and free of tool marks.

J. Joint reinforcement shall be placed on top of the bare masonry course and approximately centered over each face shells and brick. Mortar is then applied over reinforcing.

K. Masonry units in all bearing walls shall be bonded (sawtooth) at corners and intersections and shall be laid in full mortar bed.

L. Control joints and expansion joints shall be installed as shown on the plans.

M. Masonry units shall at times be handled to prevent undue chipping and breakage. No damaged units shall be laid in exposed faces of the work.

N. Cut masonry units with an approved type masonry saw.

O. The top of masonry walls and all unfinished work shall be covered and protected when not being worked on against all weather damage. Waterproof paper, canvas, boards and other non-staining materials approved by Architect shall be used for this purpose.

3.3 BUILT-IN WORK

A. This Contractor shall provide and set all necessary anchors, dowels, plugs and other miscellaneous fastening devices in a rigid and substantial fashion for attachment of the work of other Sections.

B. Set all loose steel lintels bearing plates furnished under another Section. Build in all panel boxes, inserts, grounds, flashings, spandrel waterproofing and all incidental work required.

C. Caulking spaces around built-in work shall remain free from mortar.

D. Conduit and anchors required for exterior lighting shall be built into masonry work.

E. All metal bucks set into masonry shall be anchored and shall have the back of bucks completely filled with mortar. Set temporary spreaders between jamb frame.

F. The Contractor, as part of the work, shall build in all slots, chases or openings for required proper installation of the work of other Divisions.

3.4 SCAFFOLDING

A. This Contractor shall furnish, install and maintain safe, adequate scaffolding centering and other equipment necessary for the proper execution of all masonry work.

3.5 CUTTING AND PATCHING

A. This Contractor shall be responsible for all cutting and patching of his work.
B. Coordinate masonry work with the work of other Sections and do all cutting for these trades.

3.6 COLD WEATHER REQUIREMENT

A. No frozen materials nor materials containing ice shall be used.

B. When air temperature is below 40°F and above freezing, the mixing water shall be heated.

C. When air temperature is below 32°F and above 20°F, both sand and mixing water shall be heated and if there is a wind, enclosures or wind breaks shall be provided.

D. No masonry shall be laid when temperature is below 20°F.

E. Masonry shall be protected from freezing for 24 hours after laying with covers, blankets or heated enclosures.

F. Any masonry work, or all of which is frozen, shall be removed at the contractor=s expense.

G. Neither calcium chloride or other accelerator shall be used for speeding set in cold weather.

3.7 CLEANING AND POINTING

A. Exposed brickwork and cast stone shall be cleaned with fibre brushes, working from the top down, using one of the cleaning solutions specified. No acid cleaner shall be permitted.

B. As the cleaning work progresses, all joints shall be examined to locate cracks, holes or other defects. Any such defects shall be carefully pointed up and filled with mortar. Extreme care shall be exercised to insure uniform color of the pointing mortar with the original mortar.

C. All sills and protruding work shall be cleaned of mortar droppings.

3.8 HOISTING AND CLEANING

A. The Contractor shall be responsible for the hoisting and protection of his materials and also the cleaning and removal from the site of all rubbish caused by this work.

3.10 INSPECTION AND TESTING

A. In compliance with the local Building Code AControlled Inspection≅ requirements, the Owner shall retain a testing laboratory to test samples of brick, block, mortar and grout during construction and to inspect the masonry work itself.

B. It is the masonry contractor responsibility to observe the construction and to make certain that the plans and specifications are fully complied with. The contractor shall cooperate with the inspector and any conflicts shall be immediately submitted to the Architect for solution.

END OF SECTION 04200

SECTION 04500 - MASONRY RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. Briefly, and without force and effect upon contract documents, work of this section can be summarized as follows at all building and site walls:

1. Dismantle and reset displaced elements at perimeter site granite walls.

2. Repair areas of cracked stonework where and as specified.

3. Remove and reattach spalled stonework where and as specified.

4. Replace severely damaged stonework in kind with new material to match original where and as specified.

5. Patch existing voids in stonework where and as specified and at miscellaneous locations.

6. Repair cracking, spalling, voids and poorly installed patches in stonework at granite perimeter site walls.

7. Repair anchorage at spalls and voids in limestone and reattach spalled store element or install Dutchmen as necessary.

8. Repoint open and deteriorated limestone mortar joints in the body of the building and at the granite perimeter and retaining walls as necessary (figure 25% of all joints).

9. Remove plywood infill bird-proofing at all window and north entrance door pediments and all bird-netting as necessary to facilitate repairs and install new bird-proofing as specified in Section 10290 – Pest Control.

10. Infill window openings at existing/newly expanded vault locations with limestone to match existing building stone.

11. Restore/repair/replace missing marble elements at main stair following relocation of elevator as necessary to match original.

12. Remove efflorescence, staining, biological growth and general soiling from all building facades (clean entire building) and perimeter granite walls throughout the site and granite and limestone stonework at entrance stairs. See Cleaning Section – 04510.

13. Replace sealant at all failed or improperly installed caulked joints. See Joint Sealers Section 07900

14. Repair/stabilize/replace all other misc. façade conditions as indicated on the drawings, specified herein.

1.3 QUALITY ASSURANCE

A. Experience: Work must be performed by a firm employing personnel skilled in the indicated operations, and having not less than ten (10) years routine experience in successfully completing in a timely fashion masonry restoration work comparable in scope and type to the required work of this contract, involving buildings determined by the Government to be eligible for, or listed on, the National Register of Historic Places. Workman shall be factory trained in the installation of the specified restoration mortars.

B. Regulatory Requirements: Work shall be carried out in accordance with all applicable Federal, State and local codes and requirements of other agencies having jurisdiction. In all cases the more restrictive limitation of any applicable requirements shall be followed.

C. All work shall conform to the requirements of the SHPO and the Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*.

D. Materials and Methods: All materials and methods of construction shall comply with the requirements of State and Local Building Codes.

E. In acceptance or rejection of work, no allowance will be made for lack of skill or competence on the part of the workers.

F. **Source of Materials:** Obtain materials for masonry restoration from a single source and batch for each type of material required (limestone, granite, marble, cement, sand, etc.) to ensure match of quality, color range, pattern, and texture of replacement work with the original. Architect shall reject any material that does not meet his criteria.

1.4 SUBMITTALS

A. **Product Data:** Submit four copies of manufacturer's specifications and other data for each manufactured product, including certification that each product complies with specified requirements. Include instructions for handling, storage, installation and protection of each product.

B. **Repointing**: Prepare two separate sample areas of approximately 5' high by 5' wide for each type of repointing required (limestone, granite). One for demonstrating methods and quality of workmanship expected in removal of mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.

C. **Limestone/Granite/Marble Repairs**: Provide in place samples of each type of stone repair for Architects approval. Approved samples shall be retained during construction as a reference standard for all other limestone repairs.

D. **Masonry Installation**: Prepare a 1' by 1' sample panel for new masonry installation and a 3' by 3' area on the building, where directed by Architect, for masonry repairs. Use masonry, mortar, bonding, type of joint and workmanship for masonry in project. Provide range of color, texture and workmanship expected in completed work. Retain acceptable panel during construction as a standard for judging completed work.

E. **Sealant Installation:** Prepare in place mock-up of sealant installation where directed by the Architect. (see Section 07900)

F. If alternative methods and materials to those indicated are proposed for any phase of work, provide written description including evidence of successful use on other comparable projects.

G. **Shop Drawings:** Submit detailed shop drawings, for any items required by the Architect, as specified in Section 01010.

H. **Review and Approval:** Architect's review and approval shall not relieve the Contractor from responsibility for error in shop drawings or for proper coordination and assembly of materials and equipment with other work, nor from responsibility of furnishing materials and labor not indicated on approved shop drawings, but required by the Contract Documents for completion of Work.

I. **Samples:** Submit four sets of samples of all materials used in the work of this section whether specified or not for verification purposes. Samples shall include but are not to limited to the following:

1. **Replacement Limestone**: Provide samples that show size, profile, color, texture and pattern, to match original limestone at the building.

2. **Replacement Granite**: Provide samples that show size, profile, color, texture and pattern, to match original granite at site walls.

3. **Replacement Marble**: Provide samples that show size, profile, color, texture and pattern, to match original marble at the existing main building stair.

4. **Mortar**: Provide representative loose mortar samples of all mortar materials. Install samples of each type of mortar for pointing and masonry repair in 1/2" wide joints formed between two 6" long strips of material matching the appearance of exposed surfaces adjacent to mortar in the work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.

B. Deliver all other materials to site in manufacturer's original and unopened containers, bundles or packaging, bearing labels as to the product name or title of material, product description (generic classification or type), Manufacturer's stock number and date of manufacture, Contents by volume, and application instructions.

C. Protect masonry restoration materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other materials.

D. Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

E. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F (7 degrees C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

F. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Contractor must review and coordinate all work of his contract with all other trades performing work at the building with Owner and Architect.

B. Arrange with the appropriate representative of the building owner for means of access to premises and necessary utilities, space for storage of material and equipment, etc.

C. Cold Weather Protection:

1. No patching or pointing shall be performed when outside temperature is 40 degrees F and falling or masonry temperature is below 40 degrees F.

2. Do not use frozen materials or materials mixed or coated with ice or frost. Do not use salt to thaw ice in anchor holes or slots r for any other purpose. Do not lower the freezing point of mortar by use of admixtures or anti-freeze agents, and do not use any chlorides in mortar or grout.

3. Do not build on frozen work; remove and replace stonework damaged by frost or freezing.

D. Prevent grout or mortar used in repointing and repair work from staining the face of surrounding masonry and other surfaces. Protect sills, ledges and projections from mortar droppings. The use of Acid pH cleaners will not be permitted.

E. Staining: Prevent grout or mortar from staining adjacent masonry. Remove grout or mortar in contact with masonry immediately.

F. Damage occurring to the building as a result of work of this section or Contractor's failure to protect against such damage shall be the Contractor's responsibility. The Contractor shall restore damaged areas to the complete satisfaction of the Architect at no expense to the Owner.

G. **Protection of Openings During Construction:** Protect all openings in building wall surfaces during construction with overlapping tarps, for size greater than repair area. Overlap tarps 1/4 of length; anchor tarps with stainless steel removable anchors set into mortar joints only. No damage to surrounding stonework will be allowed.

PART 2 - PRODUCTS

2.1 SCAFFOLDING

A. **All scaffolding and planking and sidewalk bridging** required for work of this section shall be the responsibility of the Contractor. Contractor shall provide continuous access to the work for the Architect so that he may review it at any time. See Section 01500.

2.2 GENERAL MASONRY RESTORATION MATERIALS

A. **Replacement Limestone, Granite and Marble:** Provide natural building stone of type, surface texture, design, size and profile to match existing limestone at the baser of the building. Comply with ASTM C 568, free from defects which would impair strength, durability or color.

B. **Mortar Materials**

1. **Cement**: ASTM C-150 (gray and white mixed as required to match existing color).

2. **Lime:** Hydrated masons lime ASTM C-207 Type S

3. **Sand:** Clean, sharp sand free of loam, silt, soluble salts, rust and organic matter. Aggregate shall conform to following size gradations:

Sieve Size	Percent Retained
No. 4	100
No. 8	95-100
No. 16	60-100
No. 30	35-70
No. 50	15-35
No. 100	2-15
No. 200	-

4. **Water:** Potable, free of deleterious amounts of oils, acids, alkalies and organic matter.

5. **Sand and lime** shall be delivered to job in unopened bags marked with proper ASTM designations. No unmarked materials will be permitted on the site. All raw materials will be sampled.

6. **Mortar Mix:** Prepare mortar mix for limestone and granite work proportioned 1:1:5, cement/lime/sand.

7. Match existing mortar in color, texture, and profile. Architect will supply Contractor finding of mortar analysis performed on original pointing mortar.

8. The use of admixtures will not be permitted without the prior written approval of the Architect.

C. Masonry Ties and Reinforcement

1. **Metal Components - General:** All metal components required for the work of this Section shall be made of stainless steel unless specifically stated otherwise in the Drawings or the Specifications.

D. Miscellaneous Masonry Restoration Materials

1. **Limestone/Granite Repair and Patching Material**: See Limestone/Granite repair section 3.05.

2. **Injection Grout:** "Jahn Series M30, M40 or M50 Injection Grout" depending on width of crack by Cathedral Stone Products, Inc. Washington, D.C. or approved equal.

3. **Stainless Steel Pins:** 1/4" and 3/8" stainless steel embossed ASTM A82 or A16 rods, by Hohman and Barnard or approved equal.

4. **Adhesive**: Sikadur Hi-Mod or Low-Mod Epoxy as required for particular application by Sika Corp. or approved equal.

5. **Structural Steel:** ASTM A36 sizes and shapes as needed.

6. **Steel Primer**: Moore: Ironclad Retardo Rust-Inhibitive Paint #163 or approved equal.

7. **Steel Finish Paint:** Moore Impervo High-Gloss Enamel #133.

8. **Weep Tubes:** 3/8" diameter PVC weep tubes.

9. **Marble Filler/Sealer:** Akabond Super Penetrating and Knife Grade Acrylic Filler and Sealer as manufactured by Axson North America (800 365-8191)

10. **Sealant:** Refer to Section 07900 - Joint Sealers.

11. **Backer Rod:** Refer to Section 07900 - Joint Sealers.

PART 3 - EXECUTION

3. 1 MASONRY REPAIR - GENERAL

A. All new/reinstalled stonework shall be tied to adjacent masonry and/or structure with a minimum of one stainless steel tie every two square feet.

B. Masonry Tie Fasteners: All masonry ties shall be fastened to back-up masonry and/or structure with hit anchors.

3.2 REMOVAL - GENERAL

A. **Removal:** Removal shall proceed in an orderly manner minimizing noise or other disturbances to the operations of adjacent facilities. All debris and refuse to be removed from building at end of each working day.

B. **Shoring:** Adequate shoring must be provided by the contractor, and designed by the contractor or an engineer retained by the contractor, for all masonry demolition work. The shoring must be designed to prevent any movement or damage to adjacent masonry.

C. **Disposal:** All construction debris must be disposed of legally off site.

3.3 MORTAR MIXING

A. Mortar mix shall be 1:1:5 (cement/lime/sand) for all joints.

B. Measure by volume only. Do not measure by shovelful - use known measure.

C. Mix ingredients in clean mechanical batcher until thoroughly intermingled.

D. Water content for repointing mortar shall contain minimum amount of water to produce a workable consistency. Do not make mixture too wet - avoid bleeding of water and segregation of constituents. A mortar is workable if its consistency allows it to be spread with little effort and if it will readily adhere to vertical masonry surfaces.

E. Water content for setting bed mortar shall contain minimum amount of water necessary to produce a workable consistency.

F. Let mortar sit for 20 minutes prior to use to allow for initial shrinkage. Place mortar within 2 hours of mixing. Do not retemper or use partially hardened material.

G. Place mortar in layers no thicker than 1/2 inch. Roughen surface of each layer to provide key for next.

H. Keep mortar damp (80-90% RH) for 72 hours or until mortar is set.

I. Match existing mortar in color, texture, and profile. Architect will supply Contractor finding of mortar analysis performed on original pointing mortar.

J. The use of admixtures will not be permitted without the prior written approval of the Architect.

K. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water spray applied at low pressure.

3.4 LIMESTONE/GRANITE REPOINTING

A. Repoint all limestone and granite mortar joints in the body of the building and site walls (figure 25% of all joints) found to be open, shelled, cracked, mismatched or otherwise defective.

B. Cut out old and deteriorated mortar and sealant using gentlest possible means as approved by the architect. . Mortar joints shall be cut and raked to remove a minimum depth of 3/4" or back to sound, solid back-up material (not to exceed 1" in depth).

C. Use a blade narrower than the joint. Do no widen joint. Clean all mortar from surfaces within the joint or crack so that the new pointing mortar bonds to the masonry, not old mortar. Do not spall or chip the masonry edges. More than one 1/2" chip every 10 feet will be unacceptable. If work is found to be unacceptable, all raking will cease without additional cost to the Owner until deficiencies in tools, workmanship, or method have been corrected to the Architects satisfaction. All damaged stonework will be replaced at Contractor's expense.

D. Pointing shall be performed using a 1:1:5 mortar mix. Match existing mortar in color, texture and joint profile.

E. Carefully brush, vacuum. Blow out or flush joints to remove all dirt and loose debris.

F. Rinse joint surfaces with water to remove any dust or mortar particles. Contractor shall maintain a five (5) gallon pressure sprayer of water filled and on the scaffold at all items that masonry work is in progress. At time of pointing, joints should be damp but free of standing water.

G. Reinstalled mortar depth to be a minimum of 3/4" or twice the joint width of the joint to be pointed, but in all cases rake back to expose sound mortar (not to exceed 1 1/2" depth).

H. Point all joints more than 1" in depth by back pointing with mortar. Pack entire joint full with mortar installed in layers no thicker than 1/4 inch, leaving no voids.

I. Protect adjacent surfaces and surfaces below. Remove droppings and splashed mortar immediately.

J. When mortar is thumbprint hard, tool joint to match existing joint profile. Do not allow mortar to extend over the edges of the stonework (featheredging).

K. Keep joints damp (80-90%rh) for 72 hours or until set.

L. Clean up all mortar droppings the day they are dropped. Droppings shall be cleaned up immediately when they fall on any masonry surface.

3.5 LIMESTONE/GRANITE REPAIRS

A. General Requirements:

1. All limestone building elements and granite site walls shall be carefully inspected for all cracks, spalls, voids, displacement, deterioration and failing existing patches. Spot sound limestone for hidden deterioration using a plastic mallet. See

elevation drawings for all conditions observed during the visual inspection of the building.

2. As indicated on the drawings and/or based on conditions found at each location determine appropriate repair procedure for each condition. Contractor shall notify architect of all questionable stone deterioration and/or repair procedures for architect's review.

3. Number all pieces before removal and save all damage pieces of stone to facilitate replication.

4. Every effort shall be made to keep in place, carefully dismantle and reinstall or restore all limestone pieces currently on the building.

5. Restore all spalled pieces immediately after dismantling.

6. Field models of all pieces, which are to be replicated, shall be taken and sample pieces shall be supplied by the contractor for approval of the architect before installation.

7. The following materials, or architect approved equal, shall be used for all limestone/granite repair work:

   a. Limestone patching material: "Jahn Series M70 Restoration Mortar" by Cathedral Stone Products, Inc. Washington, D.C. or approved equal.

   b. Granite patching material: "Jahn Series M160 Restoration Mortar" by Cathedral Stone Products, Inc. Washington, D.C. or approved equal.

   c. Injection grout: "Jahn Series M30, M40 or M50 Injection Grout" depending on width of crack by Cathedral Stone Products, Inc. Washington, D.C. or approved equal.

   d. Adhesive: Sikadur Hi-Mod or Low-Mod Epoxy as required for particular application by Sika Corp. or approved equal.

B. Limestone/Granite Crack Repair:

1. All areas of vertically cracked stonework and isolated crack locations shall be repaired as follows. As a rule, all cracks found to be 1/16 inch and greater in width shall be subject to repair. All cracks less than 1/16 inch in width shall be repaired at the discretion of the architect.

2. Remove loose cement, existing failing patch material, caulk and loose stonework. Do not widen crack. If, in the opinion of the contractor, the crack needs to be widened more than 50% of is original width, the architect shall be informed in a timely manner. The architect shall inspect said cracks, and determine the final size of the dressed crack.

3. Clean all cracks of all dirt and loose debris by brushing with a stiff, non-ferrous brush, stainless steel picks and chisels, solvent or other Architect approved method as required.

4. All cracks shall be patched using specified injection grout or patching material depending on crack size. Follow manufactures printed instructions for material preparation, insertion and application.

5. Dress patched crack to match surrounding stonework in texture and profile.

C. Limestone/Granite Replacement:

1. Carefully remove by hand any damaged limestone/granite units which are to be replaced as indicated on the drawings or judged by the architect in the field. Cut out full units from joint-to-joint in manner permitting replacement with full size units, and without damaging surrounding masonry.

2. Limestone/granite replacement units shall be fabricated of new stonework to match the original in size, shape, color, glaze, texture, etc..

3. Shore and protect adjacent masonry from damage as a result of work of this section.

4. Remove mortar, loose particles and debris from existing masonry surrounding existing units in preparation for replacement. Clean with stiff brushes or by flushing with water and compressed air.

5. Set replacement units in full bed of mortar with both horizontal and vertical joints of same width as original. Embed anchors in, and fill voids behind units with grout to match existing construction.

D. Limestone Spall Attachment:

1. All sound pieces shall be reattached using a 2 part high - mod epoxy system and stainless steel pins. (See item 4 below)

2, Following inspection, all spalls shall be carefully removed. Number pieces before removal and number adjacent location on building for later reinstallation in the original location. Save as much original material as possible for re use. Take care not to damage adjacent limestone.

3. Remove all loose masonry particles, mortar, soil, and foreign material from bonding surfaces of both fragment and limestone from which it was removed, by cleaning with stiff nonferrous brush.

4. Spalls larger than 6" x 6" x 3" thick shall be anchored with 1/4" diameter stainless steel rods set into 3/8" diameter drilled holes, or epoxy-filled voids cast into limestone. Insert rods not less than 2" into backup masonry and 2" into fragment with end countersunk at least 3/8" from exposed face of limestone. Install one stainless steel rod for each 9 sq. in. of spall surface area. Spalls smaller than above shall be epoxied back in place without the use of pins.

5. Apply adhesive to comply with manufactures directions. Coat bonding surface of building limestone and spall with adhesive, completely filling all voids and covering all surfaces.

6. Fit limestone fragment in place while adhesive is still tacky and hold fragment securely in place until adhesive has cured. Do not allow epoxy to run down face

of limestone. Reset spall shall be plumb and flush with adjacent surfaces. Maintain profile of original work.

E. Limestone/Granite Patching:

1. All gaps and voids in limestone/granite smaller than 2" x 2" in longest dimension after removal of loose material shall be patched in the following manner.

2. Square cut affected area, so that minimum mortar patch thickness will be 1", removing all loose and deteriorated material. Roughen all exposed surfaces to provide mechanical key.

3. Undercut edges of repair area to create a slight dovetail for the patch.

4. Limestone/granite areas to be patched shall be cleaned of all debris, oil, rust, etc., By brushing with a stiff brush and an Architect approved solvent. Blow out all holes.

5. Install 1/4" diameter threaded stainless steel rods, to increase anchorage of mortar patches. Place rods no greater than 3" or less than 1" apart and no less than 2" from any edges. Drill 3/8" holes so that they bed no less than 2" into the limestone. Drill holes and set rods at approximately 45 degrees above the horizontal and at opposing angles to each other to form a basket to hold the repair mortar against the stonework. Cut rods to length such than they are from 1" to 1/2" from the surface of the finished patch. Set rods in epoxy in the "mother" stonework (piece remaining in wall).

6. Patch gaps and voids with specified limestone/granite patching material following manufacturer's instructions. Install in thin layers (no greater than 1/4"). Avoid featheredging of mortar. Final layer shall match appearance and profile of surrounding limestone/granite.

7. Separation of the edges of the patch and hairline cracking will be unacceptable. Work not acceptable to the architect shall be promptly removed and refilled as directed.

F. Limestone/Granite Dutchman Installation:

1. All spalls and voids in the limestone/granite larger than 2" x 2" in the longest dimension shall be replaced with new stone (dutchman) to match original in color, texture, profile, etc..

2. Square cut effected area to accept Dutchman.

3. Dutchman depth to longest dimension ratio shall be 1:4, or a minimum of 1 – ½" thick.

4. Remove all loose masonry particles, mortar, soil, and foreign material from bonding surfaces of both fragment and limestone from which it was removed, by cleaning with stiff nonferrous brush.

5. Dutchman shall be installed in a mortar bed. Piece shall be blind-pinned using 3/8" stainless steel pins bedded in epoxy, extending at least 3" into sound stone.

Pins shall be set within dutchman no less than ¾" from face of stone. Install one stainless steel rod for each 9 sq. in. of dutchman surface area.

6. New dutchman shall be installed to be flush with adjacent stonework and original profile.

3.6 WINDOW INFILL

A. Infill exterior window openings at existing/newly expanded vault locations where indicated on the drawings with new limestone to match existing building stone.

B. New infill stonework shall be a minimum of 4" thick and shall match existing adjacent stone coursing and mortar joint size.

3.7 BIRD - PROOFING

C. Carefully remove plywood infill at all window and north entrance door pediments and all bird-netting to facilitate repairs.

D. Install new bird-proofing as specified in Section 10290 – Pest Control.

3.8 MARBLE STAIR RESTORATION

A. Restore/repair/replace missing marble elements at main stair following relocation of elevator as necessary to match original adjacent marble in all details as indicated on the drawings.

3.9 CLEAN-UP

A. Cleanup: at the end of each workday, remove empty cans, rags, rubbish, and other discarded materials from the site.

B. After mortar has fully hardened, clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water spray applied at low pressure.

C. Clean stonework, ledges and surfaces below work area at the completion of work.

D. Use of metal scrapers or brushes will not be permitted.

E. Use of acid or alkali cleaning agents will not be permitted.

F. Upon completion of the work, contractor shall thoroughly clean up all dirt and waste resulting from his work as required to restore work areas to the state of cleanliness existing before work began.

3.9 GUARANTEE

The Contractor guarantees to the Owner that said Contractor shall be responsible for any defective materials and workmanship installed by him for a period of five years. The period of guarantee shall start from the date of Owner acceptance of the work. The Contractor further guarantees to provide all necessary access provisions and to perform permanent repairs forthwith to restore the defective areas, and to make permanent repairs without reference to or consideration of the cause of any defects in the work.

END OF SECTION 04500

SECTION 04510 - MASONRY CLEANING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. Extent of masonry cleaning work is as specified herein, and as required for the proper performance of the work.

B. Abbreviated written summary: Briefly, and without force and effect upon contract documents, work of this section can be summarized as follows:

1. Provide all labor, materials, equipment, tools, supervision, protection of all adjacent non-masonry surfaces, the general public and workers, and the legal disposal of any and/or all waste material requiring special handling for the complete cleaning of all of the exterior masonry facades from grade to the roof level, all perimeter site walls and at all surfaces of the interior marble staircase.

2. Cleaning shall include but not be limited to:

   a. Removal of atmospheric soiling and staining.
   b. Removal of plant growth and vegetation.
   c. Removal of bird droppings.
   d. Removal of residual chemicals.

C. Performance Requirements: The intent of this Specification is to provide for the cleaning of areas of the building indicated above so as to render a natural, uniform clean (but not like new appearance) for all façade materials. Use the gentlest means possible to obtain desired results as approved by the Architect.

D. **All decorative stonework shall be cleaned using only the gentlest means as approved by the Architect on a location- by-location basis.**

E. Reference Standards: Cleaning shall be performed to match the level of cleanliness of approved cleaned test panels, as performed by the contractor as part of his mock-ups, prior to the start of work for each type of material to be cleaned. The approved test panels shall be maintained as the reference standard for all cleaning work specified herein.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 04500 – Masonry Restoration

1.4 QUALITY ASSURANCE

A. Qualifications: Work must be performed by a firm having not less than five (5) years regular successful experience in comparable masonry cleaning projects and employing personnel skilled in the restoration processes and cleaning operations indicated herein.

B. The foreman for the work of this section shall be on site daily during the work, shall speak the English language fluently, and shall have a minimum of eight (8) years experience with masonry cleaning.

C. Qualification of Personnel: Use adequate numbers of skilled and experienced workmen thoroughly trained and experienced in the necessary crafts who are familiar with the specified requirements of the methods used for cleaning of masonry buildings and who shall have received training from the manufacturer's representative in the safe and proper use of the equipment for proper performance of work of this section.

D. In acceptance or rejection of work, no allowance will be made for lack of skill or competence on the part of workmen.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Regulatory Requirements: Work of this section shall be carried out in accordance with Federal, State and local codes and requirements of any other agency having jurisdiction related to the transportation, handling, use and disposal of all cleaning materials deemed hazardous by the authority having jurisdiction. In all cases, the more restrictive limitation of any applicable requirement(s) shall be followed.

B. Source of Materials: Obtain materials for masonry cleaning from a single source to ensure match of quality, color, pattern, texture, etc.

C. Clean masonry surfaces only when air temperatures are 40°F (4 °C) and above and will remain so at all times, but for not less than 48 hours after completion of cleaning or as directed by the Architect. Contractor shall be responsible for maintaining specified conditions at all times and locations that cleaning work is in progress.

D. No masonry cleaning involving the use of water shall be undertaken within one month of average temperatures falling below freezing. No chemical cleaning shall be performed when ambient or wall surface temperatures fall below 50°F (10°C). Maintain temperature for a minimum three weeks following cleaning.

E. No masonry cleaning shall be performed when winds are sufficiently strong to spread cleaning materials or rinsed cleaning materials to adjacent unprotected areas.

1.6 PROTECTION

A. Protect the general public and adjacent property from contact with cleaning materials by erecting properly constructed protection, positioned to confine and prevent any over-spray of water, abrasive media or chemicals. Provide complete details of such protection for approval by the Architect.

B. Any materials that may be damaged by the effects of any of the cleaning operations shall be protected as described herein.

C. All windows and exterior doors, including glass, frames and exterior metal shall be protected using strippable masking material and painted ½" exterior grade plywood sealed at the edges with split closed cell pipe insulation and secured with non-ferrous anchors to prevent penetration of liquids and from the damaging effect of acidic and alkaline masonry cleaners.

D. In addition, employ polyethylene sheet with adhesive tape, strippable latex caulking and closed cell backer rod to protect all other situations as necessary.

E. Protect all other surrounding areas as recommended by the product manufacturer or as directed by the Architect. Such areas include, adjacent shrubs and lawns, all non-masonry surfaces and particularly metal surfaces.

F. Damage occurring to the building as a result of work of this section or Contractor's failure to protect against the occurrence of such damage shall be the Contractor's responsibility. The Contractor shall restore damaged areas to the complete satisfaction of the Architect at no expense to the Owner.

G. Operatives shall be aware of potentially hazardous nature of cleaning operations and shall wear appropriate safety clothing at all times during cleaning operations.

H. The Contractor shall inspect all masonry areas prior to performing cleaning to ensure that all repairs such as pointing, patching, etc., intended to insure the Watertightness of the building envelope **have been allowed to dry thoroughly and be deemed properly and adequately cured prior to commencement of the cleaning operation. The Contractor shall perform any/all temporary measures necessary to make the building envelope watertight prior to beginning any cleaning work.** Any/all questionable area shall be reviewed with the Architect.

I. Cleaning shall be performed in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces and even effect without streaking or damage to masonry surfaces.

J. Rinse off chemical residue and soil by working downward from top to bottom of each treated area at each stage or scaffold setting.

K. Removal of plant growth: Remove any/all plant, moss and shrub growth completely from masonry surfaces. Carefully remove vegetation by cutting at roots and allowing to dry prior to removal. Remove loose soil or debris from open masonry joints to whatever depth it occurs.

1. Apply approved cleaning material, in accordance with manufacturer's instruction. (Do not allow to plants or vegetation material to remain).

2. Remove all plant matter, roots, vegetation, seeds, etc. from joints and masonry surfaces.

L. Clean-up: All work areas shall be cleaned at the end of each working day, particularly

when the work will be interrupted by weekends, holidays and other extended periods of time.

1.7 SUBMITTALS/MOCK-UPS

A. Product Data: Submit manufacturers' technical data for each product indicated including recommendations for their storage, application and use. Include test reports and certifications substantiating that products comply with requirements.

B. Submit samples, literature and details of all tools, machinery and equipment proposed for use in the work. Remove rejected items from site.

C. Submit sample of cleaning media specified in 250ml containers with safety screw caps where appropriate and with contents clearly marked.

D. Cleaning Program: Submit a written program for each phase of cleaning process including protection of surrounding materials on building and site during operations. Describe in detail materials, methods and equipment to be used for each phase of masonry cleaning work, including material to be cleaned and type of staining or soiling to be removed.

E. The Contractor shall be responsible to maintain a log of each testing of each mix, noting location, material cleaned and type of stain or soil, for the Architect's information.

F. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide written description, including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this project.

G. Test Panels: Demonstrate materials and methods to be used for cleaning each type of masonry surface and condition on sample panels to be selected by the Architect approximately 9 ft sq. in area to determine the effectiveness of the cleaning compounds, precise cleaning procedures, the selection of an appropriate cleaning solution/water ratio as well as the level of cleanliness desired for the entire cleaning process. Tests should be conducted on each type of masonry surface, for each type of stain, and be available for inspection and approval by the Architect. Procedures may be adjusted according to test results. Materials shall be applied in strict accordance with the manufacturer's printed instructions. Follow manufacturer's recommendations and procedures for testing. Protect adjacent non-masonry materials from possible reaction with cleaning agents.

H. Review and Approval: Architect's review and approval of samples and test panels shall not relieve the Contractor from responsibility for error or for proper coordination and assembly of materials and equipment with other work, nor from responsibility of furnishing materials and labor not indicated, but required by the Contract Documents for completion of Work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job ready for use. Delivered materials shall be identical to reviewed shop drawings and samples.

B. All materials shall be delivered to the site and stored in accordance with the Contractor's

approved written Job Progress Chart. Deliver, handle and store products in accordance with manufacturer's recommendations and by methods and means, which will prevent damage, deterioration, and loss, including theft.

C. Control delivery schedules to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, provide delivery-installation coordination to ensure minimum holding or storage time for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

D. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

E. Protect cleaning materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

F. Remove materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials at no additional cost to the Owner.

1.9 PROJECT CONDITIONS

A. Contractor must review cleaning procedures and coordination with all other work at the building with Owner and Architect.

B. Cleaning work shall take place after mortar joints have been cut out for repointing and prior to the finish pointing installation.

C. Damage occurring to the building as a result of work of this section or Contractor's failure to protect against the occurrence of such damage shall be the Contractor's responsibility. The Contractor shall restore damaged areas to the complete satisfaction of the Architect at no expense to the Owner.

D. Coordinate cleaning activities with all other trades performing work on the building.

E. Sequencing and Scheduling:

1. Meet with Architect, Owner and all trades effected by the work of this section to review protection, procedures, and coordination prior to beginning of work.

2. Maintain environmental conditions and protect work during and after installation to comply with manufacturer's printed recommendations.

3. Contractor shall arrange with the Owner for means of access to premises and necessary utilities, space for storage of material and equipment, etc.

4. Contractor shall provide, at all times protected and unrestricted access to the building, through all building entrances for the public, employees, and construction workers.

PART 2 - PRODUCTS

2.1 SCAFFOLDING

A. **All scaffolding and planking and sidewalk bridging** required for work of this section shall be the responsibility of the Contractor. Contractor shall provide continuous access to the work for the Architect so that he may review it at any time. See Section 01500.

2.2 CLEANING MATERIALS

A. Water for cleaning: Clean, potable, pH neutral, free of oils, acids, alkalis, salts, organic matter and contaminants.

B. Where water has high iron or other metal content, pre-treat with complexing agents before use to reduce risk of staining.

C. Brushes: Fiber bristle only. Use Tampico for application of chemical solutions.

D. Micro-abrasives:

1. Micro-abrasives shall contain no free silica, to the approval of the Architect.

2. Where a proprietary cleaning system is used micro-abrasives shall be as recommended by equipment manufacturer.

3. Submit full supporting data for micro-abrasives.

4. Acceptable product: Quintek 180 Micron Glass Powder (UGC M-1035) available from JOS Quintek Corporation; contact Mark Sherman, Tel: 800-567-0053; Fax: 800-567-2841.

E. Chemicals:

1. Where a proprietary cleaning system is used chemicals shall be as recommended by equipment manufacturer.

2. Submit four copies of full supporting data for chemicals.

3. Use ProSoCo Sure Klean products or Architect approved equal.

F. Water / Micro-abrasive Equipment

1. Proprietary cleaning system based on micro-abrasives and low-pressure water delivered through a variety of nozzles including "standard, micro and piccolo" producing a rotating vortex process. Acceptable equipment: JOS System available from JOS Quintek Corporation; contact Mark Sherman, Tel: 800-567-0053; Fax: 800-567-2841.

2. Equipment must incorporate an accurate and adjustable pressure regulator, gauge and moisture/oil separator on air supply from compressor to nozzle and be within 100 feet of operative.

G. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates and pressures specified for, measured at spray tip (for volume).

H. Chemical Cleaning Solutions: Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of lowest concentration that will provide the required results, as established by approved test panels and as specified herein.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Comply with printed recommendations of manufacturers of cleaning systems for protecting building surfaces against damage from exposure to their products.

B. Protect persons, motor vehicles, surrounding surfaces of building whose surfaces are not being cleaned, building site, and surrounding buildings from injury resulting from masonry cleaning work.

C. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces which could be affected by such contact.

D. **Dispose of run-off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors. Disposal method shall be approved by the Architect prior to performing any cleaning operations.**

3.2 TESTING

A. Test panels shall be carried out to adequately demonstrate and assess the variables associated with the type of masonry units, the level of soiling and the equipment. For example:

1. Micro-abrasive type and range of particle sizes.

1. Nozzle type and size.

2. Working pressure.

3. Working distance to masonry to be cleaned.

4. Effectiveness of protection measures.

5. Reclamation, disposal and clean up of spent cleaning media.

B. Carry out mock-up panels for each substrate type and to representative range of soiling levels in order to establish acceptable level of clean.

C. Locations of mock-up panels shall be selected by the Architect.

D. The Architect shall be present for all mock-up panels.

E. If initial micro-abrasive methods prove unsatisfactory, combinations of methods shall be tried from acceptable alternatives. For example:

1. Application of chemical, scrape if necessary, then micro-abrasive cleaning

2. Application of chemical followed by micro-abrasive cleaning followed by mechanical removal in localised areas where the coating was thickly applied

F. Submit written results of tests, outlining methods, materials, concentrations of chemicals, dwell times, nozzle and abrasive sizes etc. Obtain approval of Architect before proceeding. Accepted mock-up panels shall form the standard and quality of work for the entire project.

3.3 CLEANING MASONRY - GENERAL:

A. Use only those cleaning methods indicated for each masonry material and location that have been approved by the Architect. Avoid overcleaning. Proceed with cleaning in an orderly manner.

B. All carved, decorative and ornamental stonework shall be cleaned using only the gentlest means as approved by the Architect. These areas shall be protected by an Architect approved method during the general cleaning process.

C. Cleaning shall be performed in a manner that results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.

3.4 WATER MICRO-ABRASIVE CLEANING [JOS]

A. Water micro-abrasive cleaning is to be employed for the general removal of soiling and general building cleaning as identified in the contract documents. This system shall not be used to clean carved, decorative and ornamental stonework and marble inset panels unless approved by the Architect on a location-by-location basis.

B. Perform cleaning as determined by testing.

C. Testing will have determined the equipment and nozzle type, micro-abrasive type and

particle size, pressure at the nozzle, working distance and level of cleanliness.

D. Clean without damaging masonry. Thoroughly rinse down cleaned masonry as the work proceeds.

3.5 WATER SPRAY AND CHEMICAL CLEANING

A. Where approved by the Architect as a substitute for the JOS cleaning system and for cleaning sensitive areas of carved and ornamental stonework the following methods shall be employed:

B. Water Application Methods:

1. Prolonged spraying: Soak masonry surfaces by applying water continuously and uniformly to a limited area for time period indicated by the Architect. Apply water at low pressures and low volumes in form of multiple fine sprays using perforated hoses or multiple spray nozzles. Erect protective enclosure constructed of polyethylene sheeting to cover area being sprayed.

2. Spray Applications: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment. Unless otherwise indicated, hold spray nozzle not less than 6" form surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.

   a. Low pressure spray: 100-400 psi; 3-6 gallons per minute.

   b. Medium pressure spray: 400-800 psi; 3-6 gallons per minutes.

   c. High pressure spray: 800-1200 psi; 3-6 gallons per minute.

C. Chemical Cleaner Application Methods:

1. General: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations using brush application method, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than recommended by manufacturer.

2. Spray application: Apply at pressures not exceeding 50 psi, unless otherwise indicated.

3. Re-application of chemical cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice. If additional cleaning is required, consult Architect.

3.6 FINAL CLEAN DOWN OF BUILDING

A. At the completion of all cleaning operations perform final clean down of building to remove all traces of micro-abrasive and/or chemical cleaners. Use only clean water and low pressure rinsing equipment.

B. Remove all protection erected as part of the cleaning operations.

END OF SECTION 04510

SECTION 05310 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Installation of metal floor decking where indicated on the drawings.

B. Related Requirements:

1. Section 03300 - Cast-in-Place Concrete.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

D. Evaluation Reports: For steel deck.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing 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.

2.2 METAL DECKING

A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 80 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: Manufacturer's standard.

2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80 zinc coating.

3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: Manufacturer's standard.

4. Profile Depth: 3 inches.

5. Design Uncoated-Steel Thickness: 0.0474 inch.

6. Side Laps: Overlapped.

2.3 COMPOSITE FLOOR DECK

C. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel, Grade 80 minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: Manufacturer's standard.

2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel, G60 zinc coating.

3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: [Manufacturer's standard.

4. Profile Depth: 1-5/16 inches.

5. Design Uncoated-Steel Thickness: 0.0474 inch.

6. Span Condition: As indicated.

7. Side Laps: Overlapped.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profilerecommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

L. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch nominal.
2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
3. Weld Spacing: Space and locate welds as indicated.
4. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of [3 inches, with end joints as follows:

1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 09900 Painting.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310

SECTION 05520 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. New Bronze pipe and tube railings at ADA compliant access ramp.
2. New Bronze hand railing at north entrance steps and at the unused stair on the north façade.
3. New Bronze hand and safety railings at main building stair as indicated on the drawings.

B. Related Sections:

1. Section 05720 - Metalwork

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

   a. Uniform load of 50 lbf/ ft. applied in any direction.
   b. Concentrated load of 200 lbf applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
   b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes on stainless steel.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

   a. Show method of finishing members at intersections.

1.5 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Bronze Pipe and Tube ADA Ramp Railings and Exterior and Interior Stair Railings:
   a. Connectorail System; Julius Blum, & Co., Inc. Carlstadt, NJ 07072; 800 526-6293; juliusblum.com
      1) Handrail and safety rail - 1-1/2" dia bronze pipe
      2) Connector Sleeves and Elbows – 1-1/2" Bronze
      3) Endcaps: No. 808 Bronze
      4) Wall Bracket: No. 375 Bronze
   b. Architect Approved Equal

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 BRONZE

A. Pipe: ASTM B 43, C2300

B. Castings: ASTM B 584

C. Extrusions: ASTM B 455, C38500

2.4 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
2. Aluminum Railings: Type 304 stainless-steel fasteners.
3. Stainless-Steel Railings: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 09900 "Painting".

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Intermediate Coats and Topcoats: Provide products that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

E. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

   1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.

H. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

I. Form changes in direction as follows:

1. As detailed.

J. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

O. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

P. For removable railing posts, fabricate slip-fit sockets from stainless-steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.8 BRONZE FINISHES

A. Remove tool and die marks and stretch lines, or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Provide Antique Bronze Satin Finish

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine existing locations to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Cover anchorage joint with flange of same metal as post, attached to post with set screws.

D. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
2. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
3. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

E. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.

3.6 ADJUSTING AND CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05520

SECTION 05720 - METALWORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. Work: Metalwork as described herein includes the following:

1. Refinish original bronze railings at main entrance as indicated on the drawings.
2. Repair corroded grates/grills at all lightwells and install new grates/grilles where indicated on the drawings.
3. Repair any deteriorated or damaged elements of railing at unused north stair.
4. Restore cast-iron torchere lamps flanking the main entrance. See Section 05801 - Historic Light Fixture Restoration.
5. Repair, scrape, prime, paint and repair existing metal fire escape as necessary. See Section 09900 – Painting.
6. Install new metal railings at South entrance ramp and landing, at North Entrance steps and at main interior stair. See Section 05520 - Pipe and Tube Railing

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300 - Cast-in-Place Concrete

B. Section 05520 - Pipe and Tube Railing

C. Section 05801 - Historic Light Fixture Restoration

E. Section 07900 - Joint Sealers

F. Section 09900 - Painting

1.4 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

B. American Society for Testing and Materials (ASTM).

C. American Welding Society (AWS).

D. National Association of Architectural Metal Manufacturers (NAAMM).

E. Federal Specifications (FS).

F. The Society for Protective Coatings (SSPC, formerly Steel Structures Painting Council).

G. The American Galvanizers Association

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Conservation Mandate: The intent of this Section is to provide for the maintenance and conservation of as many original materials as possible, in keeping with the directions of the Specifications.

B. Performance Requirements: The intent of this Section is to provide for the complete cleaning and repair of cast iron metalwork. All work and materials necessary to achieve complete cleaning and repair shall be included whether or not they are specifically identified on the Drawings or described in the Specifications.

1.6 DESIGN REQUIREMENTS

A. Definitions in ASTM 316 for railing-related terms apply to this Section.

B. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand not less than the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication. In cases where local requirements are more stringent they shall apply. Where railings support fixtures or other imposed loads, allowance shall be made for the additional loads.

1.7 QUALITY ASSURANCE

A. Contractor Qualifications: Work shall be performed by specialty Contractor firms with not less than five (5) years experience in cleaning, repairing, fabricating and finishing metalwork similar to the types indicated for this project.

B. Source of Materials: Obtain all materials from a single source for each type of material required to ensure match in quality, color, texture, reactivity, durability, etc.

C. Regulatory Requirements: Work shall comply with all applicable local, state and federal codes and governmental regulations.

D. Safety Procedures: Take all necessary precautions to ensure the safety of blast equipment operators and observers. Operators shall be completely skilled and experienced in the use of

the specified blast equipment. Blast machine operator shall be provided with an air-fed blast helmet, protective clothing and gloves. Air feeding into helmet shall meet OSHA breathing air standards.

1.8 SUBMITTALS

A. Product Data: Submit product data for Architect's approval from producer's and manufacturer's specifications for each product required, including Material Safety Data Sheets (MSDS) and application instructions.

B. Shop Drawings

1. Show all locations, markings, quantities, materials, sizes and shapes. Show full size details of fabrication and installation for each metal item required including plans, elevations, profiles of fittings, connections, anchors, details of components and attachments to other units of Work.

   a. Indicate materials, profiles of each metal work member and fitting, joinery, finishes, fasteners, anchorages and accessory items.

   b. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as unit of Work of other Sections.

2. Do not fabricate before approval of Shop Drawings.

C. Samples

1. Submit sample of each item of hardware provided in this Section.

2. Upon request of the Authority, submit one sample of each item included in this Section, for approval.

3. Samples for verification: Prepare samples of each type of metal finish required on metal of same thickness and alloy indicated for final work. Where finish involves normal color and texture variations, include sample sets composed of two (2) or more units showing limits of such variations expected in completed work.

   a. Include 6 inch long samples of linear shapes

   b. Include 6 inch square samples of plates.

   c. Include full-size samples of castings and forgings.

B. Material Samples: Submit for verification purposes, samples of all materials used in the work of this Section whether specified or not. Samples shall include, but are not limited to, the following:

1. Decorative elements: Provide two (2) samples of all/any decorative elements requiring restoration and/or replacement. One sample shall be restored existing element, and the other sample shall be replicated element.

C. Shop Drawings: Submit detailed shop drawings for all new and replacement metalwork required, and any other items required by the Architect/Owner, as specified in Section 01010.

D. Qualification Data: Submit for Architect/Owner's approval qualifications of firm and persons specified under item 1.05, A above demonstrating their capabilities and experience. Include list of completed projects with project name, address, name of Architect and Owner, plus other information specified.

1.9 DELIVERY, STORAGE AND HANDLING

A. Removal and Delivery: Remove and deliver materials at the site in a coordinated manner to insure uninterrupted progress of the work.

B. Handling: Handle metalwork on site to a minimum; exercise care to avoid damaging metal surfaces.

C. Materials to be used in the performance of the work of this Section shall be delivered to the work site in the manufacturer's original, unopened containers. Each container shall bear the manufacturer's label in legible condition.

D. Protect materials during storage and construction from wetting by rain, snow or ground water, and from intermixture with earth and other materials.

E. Protect materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

F. In the event of adulteration of the materials, or rejection of the materials by the Architect for non-conformance, the Contractor shall replace materials at no additional cost to the Owner, and in a manner causing no delay in the commencement and performance of the work.

1.10 PROJECT CONDITIONS

A. Coordination: Coordinate all removal work with roofing work. Metalwork installation shall be performed after façade and ramp work is completed.

1. Verification: Field verify conditions and schedules prior to commencement of Work to ensure compliance with design intent.

B. Environmental Conditions: Follow manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide repair and replacement metalwork composed of metals of the forms and types which comply with requirements of referenced standards, and which are free of blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, "oil canning", stains, discolorations or other imperfections on finished units will not be accepted.

B. Alloy: The alloy composition of new metal elements may differ slightly with that of the originals provided that the new material satisfies the requirement of being a compatible replacement, and upon completion of the work, will be indistinguishable from the original materials in appearance, surface finish, texture, reactivity and durability.

C. Metals

1. Steel: Provide steel in the form indicated, complying with the following requirements:

a. Tubing: Cold-formed, ASTM 316

b. Steel Plates, Shapes and Bars: ASTM 316

c. Malleable Iron Castings: ASTM A, grade as recommended by fabricator for type of use indicated

d. Steel rods: ASTM 316

2.3 CLEANING MATERIALS

A. Abrasive Blast Medium: "Black Beauty" suited for blast cleaning.

B. Blast Cleaning Equipment: Pressurized-pot type supplied with clean, dry compressed air. Equipment must have air line moisture traps and after-coolers to extract majority of liquid moisture from compressed air. The medium discharge shall be equipped with a new, unused, 3/16" diameter nozzle.

C. Cleaners: The use of other solvents, acids, alkalis, abrasives or any commercial ammonia-based cleaners will not be permitted without prior written approval by the Architect.

2.4 FABRICATION

A. General:

1. Fabricate metal to design, dimensions and details shown. Provide metal members in sizes and profiles shown, and not less than required to comply with requirements indicated for structural performance.

a. Fabricate surfaces exposed to view from materials that are smooth and free of surface blemishes.

b. Do not use materials which have strains, imperfections and discolorations, including welds at metal surfaces.

c. Fabricate and assemble items with directional finishes so that finish is uniform and in the same direction, unless otherwise indicated.

2. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature, 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.

   a. Temperature Change (Range): 100°F (55.5°C).

3. Form exposed work true to line and level, with flush surfaces and accurate angles. Ease exposed edges to radius of approximately 1/32 inch, unless otherwise indicated. Miter exposed corner joints unless otherwise indicated, and machine fit to hairline joint.

4. Complete cutting, fitting, forming and drilling, including grinding of metal work, prior to cleaning, finishing, surface treatment and application of finishes.

5. Provide reinforcement and anchorage required to fulfill performance requirements. Provide brackets and miscellaneous components required for complete installation. Provide reinforcement sufficient to withstand the anticipated loading and stresses at anchorage and fastener locations, and hardware connections.

6. Provide brackets, plates and straps with each assembly, as required for proper support and anchorage to other work.

7. Cut, reinforce, drill and tap metal work to receive hardware and similar items.

8. Non-welded Connections: Fabricate metal for interconnection of members by means of concealed mechanical fasteners and fittings unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

9. Conceal fastenings unless otherwise shown and accepted on final shop drawings.

10. Welded Connections: Use welding method which is appropriate for metal and finish indicated and which develops strength required. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

11. Weld corners and seams continuously and in accordance with recommendations of AWS and CDA. Grind exposed welds smooth and flush, to match and blend with adjoining surfaces.

12. Form changes in direction of metal members by radius bends, or by mitering.

13. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member

throughout entire bend without buckling, twisting, or otherwise deforming exposed surfaces of metal components.

14. 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. Clearly mark units for reassembly and coordinated installation.

15. Shop Applied Finishes: Apply shop finishes to match accepted control samples, with direction of grain as indicated on accepted shop drawings, for uniform appearance unless otherwise shown or directed by the Architect.

16. Separate dissimilar metals with separator material or coating recommended by fabricator to prevent corrosion and galvanic action. Do not extend coating onto exposed surfaces.

17. Provide factory applied protective covering as required to protect assemblies from damage during shipping and installation.

2.5 PAINT PRODUCTS

A. **Metal Primer**: Provide the following product, or Architect-approved equal:

1. Tnemec: Series 6, Tneme-Cryl Primer

B. **Metal Finish Paint**: Provide the following product, or Architect-approved equal (All colors to be selected by Architect):

1. Tnemec: Series 73 Endura-Shield

C. Shop Coat

1. Apply steel primer paint (general application) at a rate to provide dry film thickness of 2.0 to 3.5 mils. Apply primer paint (cavity wall and exterior application) at a rate to provide dry film thickness of 4.0 to 6.0 mils. Provide full coverage of joints, corners, edges, and exposed surfaces.

2. Apply to dry surfaces only, when surface temperatures are above dew-point, by brush, spray, or roller, thoroughly and evenly, in strict accord with manufacturer's instructions for every detail of handling.

3. Apply second coat of the approved primer, in a darker shade, to surfaces inaccessible to painting after assembly or erection.

4. Protect machined surfaces with an approved rust-inhibiting coating that is readily removable prior to erection.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Fasteners shall be of the same basic metal and alloy as the fastened metal, unless otherwise indicated. Do not use metals which may cause galvanic action or otherwise be incompatible with the metals joined. Provide isolators to prevent dissimilar metals from coming in contact with each other. Provide concealed fasteners for the interconnection of metalwork components and for the attachment to other work where fasteners were originally concealed.

1. Rivets: 1/8" – 3/16" diameter with copper mandrels and washers.

2. Screws, bolts and other fastening accessories: Copper, bronze or brass.

3. Nails: Copper or hardware bronze.

B. Dissimilar Metals Separations: Separate any metal from non-compatible metal or corrosive substrates by covering concealed surfaces, at locations of contact, with Teflon Pressure Sensitive Tape, as manufactured by USP (United States Plastic Corp.), Lima Ohio (800) 809-4217. Tape available in widths from ¼" – 9".

C. Joint Sealants: Sikaflex – 15LM, as manufactured by Sika Corporation. Refer to Section 07900 - Joint Sealers.

D. Backer Rod: Sonofoam, closed cell backer rod, as manufactured by Sonneborn. Refer to Section 07900 - Joint Sealers.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordination: Coordinate installation with work of other trades.

B. Identification of Decorative Metalwork: All sections of decorative metalwork shall be carefully marked as to location and adjacencies immediately upon removal from their existing location in a manner approved in advance by the Architect and Owner so that they can be re assembled in order in their original locations.

C. Fastening: Provide anchorage devices and fasteners where necessary for securing metal items to internal structural members, and structural members to in-place construction, such as threaded fasteners for brownstone inserts, toggle bolts, through-bolts, lag bolts, and other connectors as required.

D. Perform cutting, drilling and fitting required for the installation of metalwork and internal structural members. Set items accurately in location, alignment and elevation, plumb, level and true, measured from established lines and levels. Provide temporary bracing and angles for items as necessary.

E. Fit exposed connections accurately to form tight, hairline joints. Where cutting, welding and grinding are required for proper shop fitting and jointing of replacement items, structural members or patching of existing metal work, such work shall precede finishing treatments to avoid evidence of any such corrective work.

3.2 INSTALLATION

A. Provide anchorage devices and fasteners where necessary for securing metal items to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

   1. Provide inserts, setting plates, and other items of concealed work required for attachment of metal work, in a timely manner to facilitate ongoing construction.

B. Perform cutting, drilling, and fitting required for installation of metal work. Set work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Do not weld, cut, or abrade surfaces of metal components that have been coated or finished after fabrication and are intended for field connection by mechanical means without further cutting or fitting.

C. Fit exposed connections accurately together to form tight, hairline or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding and grinding are required for proper shop fitting and jointing of metal items, restore finishes to eliminate any evidence of such corrective work.

D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing or provide new units as required.

E. Install concealed gaskets, joint fillers, insulation and flashings as the work progresses, so as to make work weathertight, soundproof or lightproof as required.

F. Restore protective coverings that have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.

   1. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.

G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal-arc welding, for appearance and quality of welds made, and for methods used in correcting welding work. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent surfaces.

H. Corrosion Protection: Coat concealed surfaces of aluminum and steel which will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

I. Adjust metal work prior to anchoring to ensure matching alignment at abutting joints.

J. Install items as detailed in the drawings; for manufactured items, install as recommended by the Manufacturer, unless indicated otherwise.

K. Coordinate with other trades involved.

3.3 METALWORK RESTORATION AND REPLICATION

A. Establish Conditions: Document existing conditions of all metalwork, including any damage or deterioration including, but not limited to, corrosion, malformations, voids, holes, cracks, metal fatigue, missing elements, and incorrect or improper elements.

B. General: All damaged and corroded metal should be straitened and repaired, replaced or patched as necessary.

C. All open seams, tears, and holes in the metalwork shall be repaired using new galvanized sheet metal and fasteners compatible with existing metalwork.

D. Metalwork shall be resecured back to existing bracing wherever necessary.

E. Anchorage Devices: Provide corrosion resistant anchorage devices and fasteners where necessary for securing metalwork to in-place construction.

F. Patching:

1. Cut patches 1 inch larger in all directions than areas to be repaired. Minimum size shall be 2 inches x 2 inches.

2. Create depressed lip around surface of existing metalwork to be patched.

3. Install clear sealant behind patch. Patch shall then be fitted into depressed area, and perimeter butt joints of patch shall be soldered to existing metalwork. Form patch to match configuration of design as required.

4. All new patching material shall be of composition similar to existing.

G. Open Seams/Cracks:

1. Where soldered seams are open: clean off existing coating with solvent and resolder.

2. Install sealant where moving seams have opened.

3. Solder all cracks in metalwork.

H. Cleaning:

1. Upon completion of repair work clean all metalwork of corrosion and soiling using the gentilest possible means to provide for a uniform cleaned appearance.

3.4 METAL GRATES/GRILLES

A. Inspect all metal grates/grilles at the base of the building.

B. Repair or replace damaged or missing grille sections as necessary to match original and install new grilles/grates where indicated on the drawings.

C. Removal: Carefully remove deteriorated grilles requiring replacement without damaging surrounding masonry. Cut existing anchorages as necessary to remove deteriorated grills. Patch anchorage points at jambs as necessary. Do not leave any remains of ferrous metals embedded in masonry

D. Blast clean, prime and paint all original grills to remain following procedures specified herein and in Section 09900 - Painting.

E. Reinstall new primed and painted grills to match original using non- ferrous anchors as approved by the architect.

3.5 PAINTING PREPARATION

A. **General Procedures**: Remove items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, and after paint has dried, have items reinstalled by workers skilled in the trades involved.

B. **Surface Preparation**:

1. General: Clean and prepare surfaces to be painted in accordance with the manufacturer's printed instructions for each particular substrate condition and as specified.

C. **Incompatibility**: Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

E. **Materials Preparation**: Carefully mix and prepare paint materials in accordance with manufacturer's printed directions.

3.6 PAINTING PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

B, DO NOT PAINT the sash tracks (pulley stiles, parting strips, inside faces of stops) in the window jambs or any of the engaging surfaces of metal weatherstripping. Remove all paint applied to these surfaces before it dries. Tracks shall receive specified varnish coating only.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 PAINT APPLICATION

A. **New and Existing Metalwork to be Painted**:

1. Exterior wood surfaces to be painted shall receive a total of three coats as follows:

   a. One coat of specified primer.

   b. One undercoat of specified finish paint lightly tinted with a compatible tinting material, to distinguish it from the final coat of finish paint.

   c. One coat of specified finish paint.

B. **Stirring**: Stir materials before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

C. **Thinners**: Use only thinners approved by the paint manufacturer, and only within recommended limits.

D. **Application**: Apply paint in accordance with manufacturer's printed directions. Use applicators and techniques best suited for substrate and type of material being applied.

E. **Surface**: Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

D. **Coats**: The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even, smooth surface in accordance with the manufacturer's directions.

1. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

2. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.

G. **Scheduling**: Apply first coat to surfaces that have been cleaned, pretreated, repaired or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Coordinate cleaning and painting to avoid contaminating freshly cleaned or painted surfaces with dust, dirt, oils, etc.

H. Drying: Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

I. **Minimum Coating Thickness**: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry-film thickness of the entire system as recommended by the manufacturer.

J. **Pigmented** (**Opaque**) **Finishes**: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. **Completed Work**: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.8 PROTECTION

A. Protect finishes of metal work from damage during construction period by use of temporary protective coverings approved by metal manufacturer. Remove protective covering at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

3.9 GUARANTEE

The Contractor guarantees to the Owner that said Contractor shall be responsible for any defective materials and workmanship installed by him for a period of five years. The period of guarantee shall start from the date of Owner acceptance of the work. The Contractor further guarantees to provide all necessary access provisions and to perform permanent repairs forthwith to restore the defective areas, and to make permanent repairs without reference to or consideration of the cause of any defects in the work.

END OF SECTION 05720

SECTION 06100 - ROUGH CARPENTRY

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Provide rough carpentry Work as indicated on the Drawings, as required for the completed Work of this Contract, and as specified herein, including, but not limited to, the following:

1. Wood framing for floors, ceilings and partitions.
2. Rough hardware, including nails, screws, anchors, brackets, braces, bolts, nuts, fittings, and other devices required for the proper fitting, connecting, and erecting of the Work.
3. Rough frames for grilles, ducts, louvers and for other items, as indicated on the Drawings.
4. Fire-retardant treatment for wood.
5. Plywood decking, subflooring, and underlayment.
6. Miscellaneous Lumber.

1.2 WORK SPECIFIED ELSEWHERE

A. Section 02070 – Selective Demolition

B. Section 06102 – Finish Carpentry Restoration

C. Section 09230 – Gypsum Plastering

1.3 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1. U.S. Department of Commerce.

   American Softwood Lumber Standard PS 20

   Product Standard PS 1 for Softwood Plywood

2. APA Engineered Wood Association. APA Design/Construction Guide

3. Western Wood Product Association (WWPA): Grading Rules

4. Southern Pine Inspection Bureau (SPIB): Grading Rules

5. Redwood Inspection Service (RIS): Grading Rules

6. American Wood Preservers' Association (AWPA): Standard C2 (Lumber and Timber), Standard C9 (Plywood)

7. American Society for Testing and Materials (ASTM):

   - A575 Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
   - E84 Standard Test Method for Surface Burning Characteristics of Building Materials
   - D226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

8. Underwriters Laboratories, Inc. (UL): UL Test 723

9. Federal Specifications (FS).

10. American Lumber Standards Committee (ALSC).

11. West Coast Lumber Inspection Bureau (WCLIB): Grading Rules

12. National Fire Protection Association (NFPA)

    Test 255 Method of Test of Surface Burning Characteristics of Building Materials

1.4 SUBMITTALS

A. Quality Control Submittals

1. Certificates: Certification for the following wood treatments:

   a. Dip Treatment: Certification by treating plant stating chemical solutions used, submersion period, and conformance with applicable standards.

   b. Pressure Treatment: Certification by treating plant stating chemicals and process used, net amount of chemical preservative retained, and conformance with specified standards.

   c. Waterborne Preservatives: Certified written statement that moisture content of treated materials was reduced to a maximum of 19 percent prior to shipment to Project site.

d. Fire-Retardant Treatment: Certification by treating plant stating treated material complies with specified standards and treatment will not bleed through specified finishes. Submit BSA or MEA approval certification.

B. Low Emitting Materials Compliance Submittals

1. Provide documentation for each adhesive to be used on site and within the weatherproofing/waterproof membrane (interior) of the building, indicating that the adhesives comply with V.O.C. requirements as stated in Specification Section G01600.

1.5 QUALITY ASSURANCE

A. Mill and Producers Mark

Each piece of lumber and plywood shall be grade stamped indicating type, grade, mill, and grading agency certified by the Board of Review of the American Lumber Standards Committee. Mark shall appear on unfinished surface, or ends of pieces with finished surfaces.

1. Pressure Preservative Treated Material: Accredited agency quality mark on each piece of wood including treatment.

2. Fire-Retardant Treated Material: Accredited testing agency mark on each piece of wood indicating compliance with the fire hazard classification.

B. Standards

Comply with the following unless otherwise specified or indicated on the Drawings:

1. Lumber: American Softwood Lumber Standard PS 20 by the U.S. Department of Commerce. Comply with applicable provisions by each indicated use.

2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.

3. Plywood Installation: APA Design/Construction Guide, by the American Plywood Association (APA), except as indicated otherwise.

4. Grading Rules:

a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).

b. Southern Pine: Southern Pine Inspection Bureau (SPIB).

c. Redwood: Redwood Inspection Service (RIS).

5. Preservative Treatment: American Wood Preservers' Association (AWPA) Standards, quality control methods, and inspection requirements

6. Fire-Retardant Treatment: American Wood Preservers' Association (AWPA) Standards.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Keep materials dry during delivery. Store materials 6" minimum above ground surface. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation between stacks.

B. Cover stored materials until ready for use for protection from moisture. Place and anchor covering in a manner which will assure good ventilation under the covering.

1.7 PROJECT CONDITIONS

A. Correlate location of supporting members to allow proper attachment of other Work as specified in this Section.

PART 2 - PRODUCTS

2.1 LUMBER

A. General

Furnish seasoned dimensional lumber dressed to nominal sizes indicated with 19 percent maximum moisture content at time of dressing, marked "S-DRY". Comply with dry size requirements of PS 20.

1. Dress: Surfaced 4 sides (S4S) unless otherwise indicated.

B. Framing Lumber

Species: Douglas Fir (WWPA or WCLIB), or Southern Pine (SPIB), unless otherwise indicated.

Refer to Drawings

1. Light Framing; 2" through 4" thick, less than 6" wide:

   a. Stud Framing Grade: Construction Grade.

   b. Other Light Framing Grade: No. 2.

2. Structural Framing; 2" through 4" thick, 6" and wider:

   a. Grade: No. 1.

C. Board Lumber; less than 2" thick:

1. Exposed Board Lumber, for Paint Finish: Southern Pine No. 1 (SPIB), Douglas Fir 2 Common (WWPA) or Select Merchantable (WCLIB), or Redwood Construction Common (RIS).

2. Exposed Board Lumber, for Transparent Finish: Redwood Clear (RIS).

3. Concealed Board Lumber: Southern Pine No. 3 (SPIB), any species No. 4 (WWPA) or any species Standard (WCLIB), or Redwood Merchantable (RIS).

D. Miscellaneous Lumber

Standard grade, No. 3 grade, or better grade of the following species unless otherwise indicated:

1. Nailers and Blocking: Douglas Fir, Hem-Fir, Idaho White Pine or Southern Pine.

2. Furring: Douglas Fir or Southern Pine.

3. Plaster Grounds:

   a. Interior Use: Douglas Fir or Southern Pine.

   b. Exterior Use: Western Red Cedar or Redwood.

4. Floor Sleepers: Western Red Cedar or Redwood Construction Heart.

5. Door and window Bucks: Western Red Cedar or Redwood.

2.2 PLYWOOD

A. Roof and Wall Sheathing and Subflooring: APA RATED SHEATHING, EXPOSURE 1. Furnish APA PS 1 veneered panels, with span ratings for the required thicknesses as listed below unless otherwise indicated.

Thickness	Span Rating
3/8"	24/0
1/2"	32/16
5/8"	40/20
3/4"	48/24

B. All plywood used within the weatherproofing/waterproof membrane (interior) of the building shall contain no added urea- formaldehyde. This requirement applies to plywood roof and wall sheathing.

2.3 MISCELLANEOUS MATERIALS

A. Underlayment Patching Compound

Hardsetting, quicksetting type with latex or polyvinyl acetate binder.

B. Asphalt Felt

Asphalt-saturated felt, No. 15, without perforations, complying with ASTM D226.

C. Rosin Paper

Commercial, rosin-sized building paper, 0.010" thick.

D. Hardboard

PS 58, Class "Tempered, S1S, plainboard.

E. Adhesive

APA Specification AFG-01. For adhesive used on site and within the weatherproofing/waterproof membrane (interior) of the building, comply with V.O.C. requirements specified in Section G01600.

2.4 PRESERVATIVE TREATMENT

A. Treat lumber and plywood where indicated and as specified. Comply with applicable AWPA Standards and quality control and inspection requirements.

1. Fasteners and anchoring devices to be used with wood treated with waterborne preservatives shall be hot-dip galvanized or stainless steel if the wood will be exposed to moisture.

B. Complete fabrication of items to be treated to the greatest extent possible, prior to treatment. Where items must be cut after treatment, coat cut surfaces with heavy brush coat of the same chemical used for treatment or other solution recommended by AWPA Standards for the treatment.

C. Inspect wood after treating and drying. Discard warped or twisted items.

D. Pressure Treatment (Above Ground Use)

Treat the following wood items with waterborne preservatives for above ground use, complying with . AWPA Standards C2 & C9 Redry wood to a maximum moisture content of 19 percent after treatment.

1. Nailers, blocking, cants, shim stock, and similar members used in conjunction with roofing (including related flashings, trim and vapor barrier), coping, and waterproofing.
2. Nailers, blocking, furring, stripping, and similar concealed members in contact with exterior masonry and concrete (including interior wythe of exterior walls), and all sills for framing.
3. Wood items indicated or scheduled on the Drawings to be preservative treated.

E. Pressure Treatment (Ground Contact Use)

Treat the following wood items with waterborne preservatives for below ground use, complying with AWPA Standards C2 & C9.

1. Wood members placed in the ground.
2. Wood members immersed in fresh water.

2.5 FIRE-RETARDANT TREATMENT

A. Where lumber is indicated or required to be fire-retardant treated, provide "FR-S" lumber, complying with AWPA Standards for pressure impregnation with fire-retardant chemicals to achieve a flamespread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E84 or NFPA Test 255.

1. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.
2. Provide UL label or identifying mark on each piece of fire-retardant lumber.
3. Redry treated items to a maximum moisture content of 19 percent after treatment.

B. Fire-retardant Treated Plywood

Comply with APA requirements.

2.6 FRAMING HARDWARE

A. Fasteners and Anchoring Devices

Provide items of type, size, style, grade, and class as required for secure installation of the Work. Items shall be galvanized for exterior use. Unless shown or specified otherwise, comply with the following:

1. Nails and Staples: FS FF-N-105.
2. Wood Screws: FS FF-S-111.
3. Bolts and Studs: FS FF-B-575.
4. Nuts: FS FF-N-836.
5. Washers: FS FF-W-92.
6. Lag Bolts or Lag Screws: S FF-B-561.
7. Masonry Anchoring Devices: Expansion shields, masonry nails and drive screws: FS FF-S-325.
8. Toggle Bolts: FS FF-B-588.
9. Bar or Strap Anchors: ASTM A575 carbon steel bars.
10. Wall Plugs: Corrugated type, galvanized steel, 24 USS gage min, not less than 2" wide x 2-1/2" deep.
11. Cross Bridging: Nailable type, galvanized steel, 16 USS gage min, by 3/4" wide.
12. Metal Hangers and Framing Anchors: Size and type for intended use, galvanized finish, manufacturer's recommended fasteners.
13. Buck Anchors: Corrugated type, galvanized steel not lighter than 12 USS gage min, 4" wide (except where partitions are less than 4" thick) by 8" long, punched for two 5/16" carriage bolts at buck end.
14. Sleeper Anchors: Approved type, galvanized steel not lighter than 20 USS gage min, not less than 1-1/4" wide, designed to anchor into concrete not less than 1-1/2" and permit height adjustment of sleeper.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions

Examine substrate and supporting structure on which rough carpentry is to be installed for defects that will adversely affect the execution and quality of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION - GENERAL

A. Do not use units of material with defects which impair the quality of the Work and units which are too small to fabricate the Work with minimum joints or with optimum joint arrangement.

B. Install Work accurately to required lines and levels with members plumb and true, accurately cut and fitted and securely fastened. Closely fit rough carpentry to other associated construction.

C. Securely attach carpentry Work to substrates by anchoring and fastening as indicated, or, if not indicated, as required by the referenced standards. Select fasteners of size that will not penetrate through members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required. Set nail heads in exposed Work which is to be painted or stained and fill resulting holes.

D. Fire-retardant Treated Wood

1. Do not rip or mill; only end cuts, drilling holes and joining cuts shall be permitted.

2. Where material is cut to length, shaped or grooved after treatment, surfaces thereby exposed shall be protected by tightly butting them against noncombustible or fire-retardant treated material, in accordance with the NYS Building Code. Drilled holes shall be covered with tightly fitting noncombustible cover plates.

3.3 WOOD FRAMING

A. Install framing members of nominal sizes indicated or of units built-up to dimensions indicated, on spacings shown. Construct required openings for installation of related work. Do not splice structural members between supports.

B. Anchor and nail members as indicated. If not included, comply with recommendations of the NFPA.

C. Install miscellaneous blocking and framing indicated and as required for attachment and support of facing materials, fixtures, specialty items, and trim.

D. Stud Framing

Install stud framing indicated. Unless otherwise shown, use 2" x 4" wood studs spaced 16" o.c with 4" face perpendicular to direction of wall or partition. Install single bottom plate

and double tip plates 2" thick by width of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction.

1. Construct corners and intersections with not less than 3 studs. Frame openings with multiple studs and headers. Install nailed header members of thickness equal to width of studs.

2. Install diagonal bracing in exterior wall stud framing unless otherwise indicated. Brace both walls at each external corner, full story height, at 45 degree angle. Use either a let-in 1" x 4" board or 2" x 4" blocking.

E. Joist Framing

Install framing of sizes and on spacings shown. Install with crown edge up and support ends of each member with not less than 1-1/2" of bearing on wood or metal, or 3" on masonry. Attach to wood bearing members by toe nailing or metal connectors; frame to wood supporting members with wood ledgers or with metal connectors. Fire-cut members built into masonry (if any). Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceed 4 feet. Do not notch in middle third of joists; limit notches to 1/6-depth of joist, 1/4 at ends. Do not bore holes larger than 1/3-depth of joist or locate closer than 2" from top or bottom. Install solid blocking (2" thick by depth of joist) at ends of joists unless nailed to header or band member.

1. Lap members framing from opposite sides of beams, girders or partitions not less than 4" or securely tie opposing members together. Install solid blocking (2" thick by depth of joist) over supports.

2. Anchor masonry bearing members with 1/4" x 1-1/4" metal strap or "T" anchors with wall ends bent 4" at every second joist. Extend anchors not less than 1'-4" along bottom of joist end and nail.

3. Anchor members paralleling masonry with 1/4" x 1-1/4" metal strap anchors spaced not more than 8 feet o.c. Extend anchors at least 4" into masonry, turn up 4" and extend over and fasten to 3 joists.

4. Install solid blocking between joists under jamb studs at openings.

5. Under non-load-bearing partitions, install double joists separated by solid blocking equal to depth of studs above.

    a. Install triple-joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures, unless otherwise shown.

F. Install bridging between joists where nominal depth-to-thickness ratio exceeds 4, at intervals of 8 feet.

3.4 WOOD NAILERS, BLOCKING, AND GROUNDS

A. Install required items where indicated and where required for support, attachment or screeding of other Work. Form to shapes indicated or required. Coordinate locations and cut and shim as required to provide items at true and level planes to receive Work to be attached. Install closure strips to nailers at all edges.

1. Attach to substrates as indicated; if not indicated, size and space fasteners as required to support applied loading. Maximum spacing of fasteners shall not exceed 16". Unless otherwise shown on the Drawings, install and secure material to non-wood construction as follows:

   a. To Concrete: Attach material less than 1-1/2" thick with screws and non-ferrous metal expansion shields. Attach materials 1-1/2" and thicker with machine bolts and non-ferrous metal compound type anchors.

   b. To Concrete Unit Masonry: Attach material to new masonry with annular ring nails driven into wall plugs where fastening occurs at joints of masonry or with special hardened steel masonry nails where fastening occurs in the masonry units. Attach material to existing masonry with machine screws and non-ferrous metal expansion shields where fastening occurs in solid portions of masonry. If fastening occurs at cells of masonry, secure material in place with toggle bolts.

   c. To Brick Masonry: Attach material to new masonry with annular ring nails driven into wall plugs. Attach material to existing masonry with machine screws and non-ferrous metal expansion shields.

   d. To Steel: Attach material with galvanized bolts and nuts or stainless steel machine screws tapped into the metal, as required by conditions.

   e. To Non-Ferrous Metal: Attach material with stainless steel or other approved non-ferrous metal bolts and nuts or self-tapping screws, as required by conditions.

2. Counter-sink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry Work. Where possible, anchor to formwork before concrete placement. Bevel both edges of members to be anchored in concrete. Shims shall be cedar shingles or redwood wedges.

3. Install permanent grounds of dressed, preservative treated, keybeveled lumber not less than 1-1/2" wide and of the thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

4. The grounds for coat hook and bracket strips in wardrobe cabinets shall be attached to partitions with toggle bolts and to brick walls with expansion bolts before any plastering is done.

3.5 PLYWOOD SHEATHING, SUBFLOORING, AND UNDERLAYMENT

A. Comply with printed installation requirements of the APA Design/Construction Guide, for plywood application required, unless otherwise indicated.

B. Plywood Underlayment

Install underlayment just prior to installation of finish flooring. Stagger end joints between panels in relation to each other and stagger all joints in relation to substrate jointing. Allow 1/32" space between panel ends and edges for expansion. Fasten in accordance with APA recommendations. Prior to installation of finish flooring, patch damaged areas wider than 1/16". Set nails 1/16", but do not fill. Sand rough areas smooth, and uneven joints flush. Fasteners must be flush with the surface of the subfloor.

C. Roof Sheathing

Install panels with face grain across supports. Provide supports at edges by use of clips, wood blocking, or T. & G. panels. Allow 1/16" spacing at panel ends; 1/8" spacing at edges.

Nail 6" o.c along edges and 12" o.c at intermediate supports.

D. Wall Sheathing

Allow 1/16" spacing at panel ends and 1/8" spacing at edges.

Nail 6" o.c along panel edges and 12" o.c at intermediate supports.

E. Subfloor

Install panels continuous over two or more spans, with face grain across supports. End joints shall occur over supports. Allow 1/16" spacing at panel ends and 1/8" at edges.

Before placing panels, apply continuous line of adhesive on joists.

F. Nails: Common

For plywood thickness to 1/2": 6d.

For plywood thickness greater than 1/2": 8d.

3.6 WOOD FURRING

A. Install members plumb and level with closure strips at all edges. Shim with wood as required to achieve tolerance specified.

1. Fastening: Attach to substrates as indicated; if not indicated, attach material as specified for nailers and blocking.

2. Tolerance: Shim and level wood furring to a tolerance of 1/8" in 10'.

3. Furring to Receive Plywood Paneling: Unless otherwise indicated, 1" x 3" furring at 2' o.c, horizontally and vertically.

4. Furring to Receive Gypsum Drywall: Unless otherwise indicated, 1" x 2" furring at 16" oc, vertically.

5. Option: In lieu of the grounds for hook and bracket strips, fasten the strips directly to the finished plastered walls provided toggle bolts are used, spaced not over 2' o.c. This option is given on condition that a power drill is used for drilling holes for toggle bolts through the plaster and terra cotta partitions.

6. Where walls are furred out to receive wardrobes, lockers, and other casework, provide and set all required dressed studs, blockings, nailing pieces, and grounds. The studs shall be bolted to the iron frames with 3/8" diameter bolts, spaced as indicated on Drawings.

3.7 FLOOR SLEEPERS

A. Unless otherwise indicated, install 3" x 3" strips, 12" oc and across abutting walls and restricting features. Anchor to slab with sleeper anchors 16" o.c. Shim level to required height with redwood wedges 8" o.c. Fill space between sleepers and floor slab solid with 1 part Portland cement and 2-1/2 parts sand mortar.

3.8 BOARDS, STRIP

A. All Work necessitating the furnishing of boards, strips, casings, and other Work of this nature and the doing of all incidental Work required for the proper finishing and completion of the Work, to the entire satisfaction of the Authority, shall be done by the carpenter.

B. Where wall panels of tackboard or pegboard are indicated on walls of classrooms, kindergartens and rooms of instruction, wall shall be furred out with wood furring strips, blocking, and furring, of sizes as required for the conditions, installed vertically approximately 16" O.C. to receive the tackboard and pegboard. Furring strips shall be toggle-bolted or expansion-bolted (flush head) to walls and partitions.

C. Provide fiberglass insulation back of pegboard on walls of kindergartens and rooms of instruction. Fiberglass shall be 1/2" thick, flexible duct insulation manufactured by Owens-Corning, secured to walls with an adhesive approved by the Manufacturer. See Drawing Details.

D. Furnish and set all wood blocking and nailing strips at coping coverings, canopy fascias, slag stops, fascia boards, base flashing pitch pockets, railing sleeves and similar locations, of No. 1 common southern pine, of sizes indicated on Details. All blocking and nailing strips shall be preservative treated by pressure method as specified in Art. 2.04.

E. Furnish and set all blockings required at skylight and ventilator curbs, and at all other places where indicated or required.

F. Provide wood curbs of sound, seasoned, dressed material of size indicated on Drawings, with corners mitered and securely nailed, and with top outer edges splayed off. Anchor Wood curbs in place at top of concrete curbs with 3/8" anchor bolts, 3 feet on centers and at brick curbs with 1/2" bolts extending through curb angles. Top nuts of all bolts shall be countersunk into curbs.

G. Where copper gutters, or other such copper covered Work is indicated on the Drawings, furnish and set all wood nailing strips, blocking, sheathing, rough framing and other members required for the securing and backing of the copper covered Work. For shapes, spacing and locations of the rough carpentry Work, see Detail Drawings.

H. Where batten seam copper roofing is indicated on Drawings, furnish and install all required wood battens and nailing sleepers together with all other required wood blocking, nailing strips, ridge strips, and other members, as indicated on the Details. The wood nailing sleepers, to receive the wood battens shall be nailed to sleeper clips which shall be embedded in the sloping concrete roof slab as shown on Detail, spaced as indicated.

I. The sleeper clips shall be 9 gage galvanized wire floor sleeper clips and shall be spaced 16" o.c. The top surface of nailing sleepers shall be set level and true by using wood or metal leveling strips. Wood batten shall be secured to the nailing sleepers with proper size nails by toe nailing at each bearing or as will be directed.

J. Furnish and install all required wood nailing sleepers of the required size under all standing and transverse seams of copper roofing together with all wood blocking, nailing strips, ridge strips, and other to properly install and receive the copper roofs, gutters, eaves, and other items as indicated on the Drawings. Verify locations of nailing strips.

3.9 ROUGH HARDWARE

A. Furnish and install all rough hardware, such as nails, bolts, buck anchors, clips, (including expansion and carriage bolts for wall seats, wardrobe brackets, etc.), and all other rough hardware required to secure the carpentry work in place, unless otherwise specified.

END OF SECTION 06100

SECTION 06102 – FINISHED CARPENTRY RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior Architectural Woodwork including, but not limited to:

   a. Repairing/replacing all damaged and deteriorated interior wood elements including all interior wood paneling, mouldings, trim, doors, door surrounds, chair and picture rail and all other wood details.

   b. Restore finish on original woodwork above to match original finish and sheen

1.3 RELATED SECTIONS

A. Section 06100 - Rough Carpentry

B. Section 09900 - Painting

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data for each type of product and process specified, and incorporated into woodwork during fabrication, finishing and installation. Include details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.

C. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated material:

1. *For each type of preservative-treated wood product include certification by treating plant* stating type of preservative solution and process used, net amount of preservative retained, and compliance with applicable standards.

2. For water-borne-treated products include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

D. Shop drawings showing location of panelwork, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking and nailers, including concealed blocking and reinforcing specified in other Sections.
3. Fire retardant treatment data

E. Samples for initial selection of the following in the form of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.

1. Each type of paneling and molding specified.
2. Each type of trim specified.

F. Samples for verification of the following:

1. Lumber and panel products with nonshop-applied transparent and opaque finishes, 50 sq. in. for lumber and 8 by 10 inches for panels for each species and cut, with one-half of exposed surface finished.
2. Lumber and panel products with shop-applied transparent and opaque finishes, 50 sq. in. for lumber and 8 by 10 inches for panels for each finish system and color.

G. Product certificates signed by woodwork manufacturers certifying that their products comply with specified requirements.

H. Qualification data for firms and persons

1.5 QUALITY ASSURANCE

A. Restoration Specialist: Work must be performed by a firm employing personnel skilled in the indicated operations, and having not less than ten (10) years routine experience in successfully completing in a timely fashion woodwork restoration work comparable in scope and type to the required work, involving buildings determined by the Government to be eligible for, or listed on, the National Register of Historic Places.

B. Fabricator Qualifications: Firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

C. Single-Source Responsibility: Arrange for production of architectural woodwork by a single firm.

D. Single-Source Responsibility for Fabrication and Installation: Engage a qualified woodworking firm to assume undivided responsibility for fabricating, finishing, and installing all architectural woodwork specified in this Section.

E. Quality Standard: Except as otherwise indicated, comply with the following standard:

1. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grades of exterior and interior architectural woodwork, construction, finishes, and other requirements.

    a. Provide AWI Certification Labels or Certificates of Compliance indicating that woodwork meets requirements of grades specified.

F. Mockups: Prior to fabricating or installing panelwork, construct mockups to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups of the size indicated, using materials indicated for final unit of work, and complying with the following requirements.

1. Locate mockups on site in the location indicated or, if not indicated, as directed by Architect.
2. Notify Architect one week in advance of the date and time when fabrication of each mockup will be available for inspection.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's acceptance of mockups before start of final unit of Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
    a. When directed, demolish and remove mockups from Project site.
    b. Accepted mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

G. Historical Accuracy Mandate: All visible building elements, including plain and ornamental features, materials, and methods of fabrication and construction, shall match as closely as possible the original elements of the building. The Contractor and Subcontractors, as well as all Fabricators of specialty items, shall make themselves familiar with details through examination of actual samples of historic components. The Work of this Project shall match in quality, style and detail, the exisiting and original details to the approval of the Architect.

H. Wood for Transparent Finish: New wood shall match original existing species and grade, or premium grade whichever is more stringent. New inserts in existing wood shall be selected to match grain, color and figure.

I. Acceptability of Work: In evaluation of work offered for the acceptance of the Architect, no allowance will be made for lack of skill or competence on the part of workers.

J. Review and Approvals: Architect's review and approval shall not relieve Contractor from responsibility for error in shop drawings or proper coordination and assembly of materials

and equipment with other work, nor from responsibility for furnishing materials and labor not indicated on approved shop drawings, but required by conditions or the Contract Documents for completion of the Work.

K. Certifications: Contractor and subcontractors shall possess all licenses, certifications or other written approvals, as required by the manufacturers supplying restoration materials, and other materials necessary for the execution of work specified in this Project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

B. Do not deliver woodwork for transparent finish until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

C. All materials when delivered to the site shall be so stored to insure proper drainage, ventilation and protection from the elements.

D. All materials salvaged from the site shall be stored to insure protection from damage by the elements, loss, or theft.

C. Salvaged, repaired woodwork shall not be delivered to the site until ready to be installed.

D. No kiln-dried materials shall be placed in any building unit unless the unit is sufficiently dry.

1.7 PROTECTION

A. Take all necessary precautions to protect all persons (whether engaged in the work of this Section or not) from all hazards of any kind associated with the work of this Section.

B. Take all necessary precautions to protect all property and materials (whether subject to the work of this Section or not) from any harm or damage associated with the work of this Section.

C. Perform all work of this Section in accordance with all Federal, State, and local regulations regarding the transportation, storing, handling, application, removal and disposal of the products involved.

D. Take all necessary precautions to prevent fire and spread of fire.

1.8 ARCHITECTURAL WOODWORK REMOVAL AND PROTECTION

A. All architectural woodwork indicated for salvage shall be removed from the building before general interior retrofit and demolition work begins. No salvaged woodwork shall be stored at the site unless specifically approved by the Architect.

B. All woodwork to remain shall be protected by padded protective barriers to resist damage by the work of other trades.

C. All existing architectural woodwork to be removed shall be carefully removed, labeled by schedule number, and padded and crated. The Contractor shall be responsible for the safe removal and storage of all interior architectural woodwork. All material that is damaged or lost shall be replaced by the Contractor at no cost to the Owner.

1.9 DEFINITIONS

A. Exterior architectural woodwork includes wood windows, doors, blocking, shims, and nailers for installing woodwork items unless concealed within other construction prior to woodwork installation.

1.10 PROJECT CONDITIONS

A. Contractor shall examine conditions, and notify the Architect in writing, of any conditions detrimental to proper and timely completion of work. Do not proceed with repairs until conditions have been corrected in a manner acceptable to the Architect.

B. Damage occurring to the building or to its contents as a result of work of this Section, or Contractor's failure to protect against such damage, shall be the Contractor's responsibility. The Contractor shall restore damaged areas to the complete satisfaction of the Architect at no expense to the Owner. The Contractor shall restore or replace all damages or losses to existing intact materials resulting from his operations, at no expense to the Owner.

C. Contractor must review removal and installation procedures and coordinate with other activities and work of other trades.

D. Environmental Conditions: Obtain and comply with all woodwork fabricator's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork will be within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

E. Weather Limitations: Proceed with installing exterior finish carpentry only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's

recommendations and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

F. Field Measurements: Where woodwork and other finish carpentry is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

   1. Verify locations of concealed framing, blocking, and reinforcements that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Conditioning: Contractor shall be observant of temperature and relative humidity requirements for woodwork installation. Do not install woodwork when temperature and relative humidity are outside acceptable limits for optimum installations.

B. Coatings and Finishes: Ambient temperature must be greater than 41 degrees F. Do not proceed with application if the surface is damp or if rain is expected within 12 hours following application.

C. Materials shall be used only within the manufacturer's recommended temperature tolerances.

D. The Contractor shall take all necessary precautions to protect the building and materials from freezing during repair and treatment.

1.12 COORDINATION

A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that all architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Provide materials that comply with requirements of the AWI quality standard for each type of panelwork and quality grade indicated.

B. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

C. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NHLA - National Hardwood Lumber Association.
3. NLGA - National Lumber Grades Authority.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

D. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

2.2 ARCHITECTURAL WOODWORK, GENERAL REQUIREMENTS

A. The grades of all materials under this section shall be as defined by the rules of the recognized association of lumber manufacturers producing the materials specified. Materials for millwork shall conform to, or exceed, the requirements of "Premium Grade, Class 1" as established by Quality Standards of the Architectural Woodwork Institute. Where conflicts occur between these standards and this Specification, the more stringent requirement shall govern in each case.

B. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification.

C. Lumber and finished woodwork throughout shall be of sound stock, thoroughly seasoned, kiln-dried to a moisture content not exceeding 19% for framing and 11% for finish.

D. Work that is to be finished or painted shall be free from defects or blemishes on surfaces exposed to view that will show after the finish coat is applied. Any materials which are in any way defective and not up to specifications for quality and grade, or otherwise not in proper condition shall be rejected.

E. All glues shall be non-staining waterproof types as manufactured by 3M Company, Pittsburgh Plate Glass Company, Borden Company or equal manufacturer as approved by the Architect.

F. All carpentry and millwork materials exposed to the weather or in contact with masonry or other dissimilar materials shall be preservative treated, including all field cuts and fittings.

2.3 FINISH CARPENTRY AND MILLWORK REPAIR MATERIALS

A. Quality Standards: The Quality Standards of the Architectural Woodwork Industry (AWI), shall apply and by reference are made a part of this specification.

B. Quality Grade: Material and workmanship of all woodwork shall conform to the Premium Grade requirements of the AWI Quality Standards.

C. Wood for finish millwork shall match existing wood species. See paragraph 2.3 below.

D. Joinery of panels, stiles and rails, running and standing moldings, crown moldings, brackets, and other ornamental elements shall be fabricated to match existing, or AWI Premium Grade, whichever is more stringent.

2.4 REPLACEMENT WOOD

A. Provide premium grade, solid wood, free of defects which would impair appearance, strength or durability.

1. All wood for infill repairs within historic fabric shall from either dismantled buildings or recovered logs and shall match existing in species with color, figure, grain, texture, hardness, and general attributes and appearance to match original.

2. All new wood shall match existing being replaced or restored. New wood shall match original in species with color, figure, grain, texture, hardness, and general attributes and appearance to match original.

3. Wood Moisture Content: Provide kiln-dried (KD) lumber with an average moisture content range of 9% to 13% for exterior work and 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed 8%-13% for interior wood finish or 9%-14% for exterior trim (as defined by AWI).

B. For Dutchman Requiring Transparent Finish: Furnish wood for dutchman so that when installed, figure and grain shall be similar in direction and general appearance as that of surrounding existing wood.

C. Provide replacement wood members, moldings and dutchmen with dimensions, profiles and details to match originals, or existing adjacent work into which new wood is being matched and installed. All glues shall be non-staining, waterproof, aliphatic resin types.

D. All wood potentially subject to weather exposure shall be water-repellent preservative treated after machining per NWWDA I.S. 4.

2.5 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Wood Preservative treatment shall be applied to all restored wood features exposed, or potentially exposed, to the weather. The preservative shall be a brush-applied or dipped treatment of sodium tetraborate, or similar borate-based compounds, in conformance with

standards of the American Wood Preservers Association, and with all applicable requirements of governing authorities having jurisdiction.

B. Wood Preservative shall be compatible with transparent finishes as required.

C. Preservative Treatment by Nonpressure Process: Comply with NWWDA I.S. 4 and the following for items indicated to receive water-repellent preservative treatment.

1. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient.
2. Water-Repellent Preservative/Insecticide: NWWDA-tested and -accepted preservative and water-repellent formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient, combined with an insecticide containing chloropyrifos as its active ingredient.

D. Preservative Treatment by Pressure Process: Comply with AWPA C2 (lumber) and AWPA C9 (plywood) and the following for items indicated to receive pressure preservative treatment. Mark each treated item with the Quality Mark Requirements of an inspection agency approved by American Lumber Standards Committee Board of Review.

1. Preservative Chemicals: Pressure-impregnate woodwork with preservative chemicals acceptable to authorities having jurisdiction. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
   a. Do not use chemicals containing chromium or arsenic.
2. Pressure-treat aboveground items with preservatives to a minimum retention of 0.25 lb/cu. ft.. Kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively.

E. Extent of Treatment: Treat each item of exterior woodwork regardless of species from which it is fabricated.

F. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

2.6 REFINISHING MATERIALS

A. Water: Clean, potable water free of deleterious amounts of oils, acids, alkalis, sediment, rust, salts and organic matter.

B. Powdered Detergents:

1. Dirtex Ammoniated Cleaner, by The Savogran Co., Norwood, MA.

2. (Non-phosphated) – Soilax, by Ron Mophot's, Laguna Hills, CA.

C. Wood Grain Filler: Acrylic-based wood grain filler.

D. Tint for wood filler: Powdered color pigments, colors selected and/or mixed as appropriate to match and blend with existing wood.

E. Stain: An oil wiping stain composed of colors selected and/or mixed as appropriate to match and blend with existing wood. Ensure compatibility of both stain and finish coat, based on the manufacturers' recommendations. Pending on-site testing and mockups, finish color shall be a medium to dark walnut for exterior woodwork, and a cherry satin finish for the interior woodwork. Manufacturers include the following:

1. Danish Oil Finish by WATCO

2. Minwax, Montvale, NJ.

3. *Rez*, PPG Architectural Finishes, Inc., Pittsburgh, PA.

F. Finish Coatings: Shellac and/or varnish to be selected upon Architect-directed testing. No testing shall begin without written confirmation from the Architect.

1. Shellac – Clear, natural white (3 lb.) shellac, such as manufactured by Zinsser, Somerset, NJ, or approved equal. Provide 2 lb. cut with alcohol unless noted otherwise.

2. Spar Varnish and Semi-gloss Varnish – such as McCloskey brand, manufactured by Valspar Corp., Philadelphia, PA, or approved equal.

G. Miscellaneous refinishing materials:

1. Fine grade Scotch-Brite pads (white and/or green type, or grade equivalents of 0000, 000, 00 and 0), manufactured by the 3M Company, St. Paul, Minnesota 55144, or approved equal.

2. Very fine steel wool, grade 0000, clean and free of contaminants and corrosion.

3. Clean, soft, lintless, cotton rags.

H. Solvent cleaners and thinners:

1. Lacquer Thinner - Commercial manufacture

2. Denatured Alcohol - Commercial manufacture

3. Mineral Spirits - Commercial manufacture

2.7 EPOXIES, ADHESIVES, FASTENERS

A. Epoxy adhesives shall be products of Sika Corporation, Lyndhurst, NJ, 201-933-8800; Abatron, Inc., Gilberts, IL, 312-426-2200; Philadelphia Resins, Inc., Montgomeryville, PA; or approved equal.

B. Wood filler shall be Woodepox #1 as made by Abatron, Inc., Gilberts, IL, 312-426-2200, or low modulus epoxy resin mixed with microballoons.

C. Adhesives for repair shall be non-staining, waterproof, aliphatic resin type glue, as made by Borden Company, or approved equal.

2.8 FABRICATION OF WOODWORK REPAIRS AND REPRODUCTIONS

A. All work shall comply with AWI Section 1000, Premium Grade for new millwork. Repair existing millwork exactly matching existing joinery, profiles and dimensions.

B. Work shall be fabricated to designs, dimensions, and details shown on the Drawings and approved shop drawings, and shall replicate existing features, construction, profiles and overall appearance, unless specifically indicated otherwise.

C. Mill all finish wood accurately to detail, with clean cut moldings, profiles and lines, machined, sanded smooth, housed, jointed, blocked, put together in the best manner. Provide for swelling and shrinkage, and to assure integration with the work remaining in place without warping, splitting or opening of joints.

D. Cut panels and trim from solid stock to match fabrication of existing originals. Match dimensions of built-up members. Fabricate all trim and moldings in single lengths.

E. Fabricate new woodwork in the shop, in complete and/or as large units as practical, leaving only fitting, assembly, installation and a minimum of fabrication and finishing to be performed at the building. Assembled work shall be rigidly secured and permanently fastened together with concealed fasteners.

2.9 INTERIOR STANDING AND RUNNING TRIM

A. Softwood Trim: Provide finished lumber and moldings complying with the following requirements including those of the grading agency listed with species:

1. General: Unless otherwise indicated, all interior woodwork shall be of the following type:
    a. Species: To match existing
    b. Grade: To match existing
2. Texture: To match existing
3. Lumber for Transparent Finish (Stained or Clear): To match existing

B. Custom Wood Molding Patterns: Provide custom moldings made to patterns that match historic shapes and according to designs provided in the Drawings. In consultation with the Architect, review samples of existing woodwork to verify details of shapes and sizes. See Schedule for types, dimensions and locations.

2.10 BOARD PANELING (FOR TRANSPARENT AND OPAQUE FINISHES)

A. Softwood Board Paneling: Tongue-and-groove softwood lumber paneling, custom fabricated for attachment by nailing. See Drawings, dimensions, profiles and locations.

1. Quality Standard: Comply with AWI Section 300.

2. Grade: Clear, all heartwood; resawn and free of defects.

3. Grade: Custom.

4. Wood Species: Antique southern yellow pine.

5. Pattern: 1-by-6, vee joint, tongue and groove, 5-1/16-inch coverage.

B. Length: Uniform lengths of dimension indicated or required to provide full-length pieces without intermediate end joints.

2.11 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails of the following materials, in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer.

1. Stainless steel.

B. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

1. Screws: Select material, type, size, and finish required for each use, nonferrous metal or hot-dip galvanized, unless otherwise indicated. Comply with ASME B18.6.1 for applicable requirements.

2. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.
   a. Use stainless-steel nails for exterior applications.
   b. Aluminum nails
   c. Hot-dip galvanized nails.
   d. Any material above.

3. Where finish carpentry materials are exposed in areas of high humidity, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153.

C. Furring, Blocking, Nailers and Shims: Softwood or closed-grain hardwood lumber, kiln dried to less than 15 percent moisture content.

D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts unless otherwise indicated. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

D. Glue: Aliphatic- or phenolic-resin wood glue recommended by manufacturer for general carpentry use.

E. Sealants: Refer to Section 07900 Sealants

2.12 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard, specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry in relation to relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate all woodwork to dimensions, profiles, and details indicated.

1. Ease edges of lumber ¾ inch thick or less to 1/16-inch radius.
2. Ease edges of lumber ¾ inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Condition all woodwork to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

C. Prime and backprime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section 09 90 00, Painting

D. Before installing woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.3 INSTALLATION, GENERAL

A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of panelwork involved.

B. Quality Standard: Install woodwork to comply with WIC Section 26 for the same grade specified in Part 2 of this Section for type of woodwork involved.

C. Do not use wood materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

1. Do not use manufactured units with defective surfaces, sizes, or patterns.

D. Install woodwork plumb, level, true, and straight with no distortions, aligned with adjacent materials. Use concealed shims where required for alignment.

1. Scribe and cut woodwork to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink nails, fill surface flush, and sand where face nailing is unavoidable.
3. Install to tolerance of 1/8 inch in 96 inches for plumb and level. Install with no more than 1/16 inch in 96 inches vertical cup or bow and 1/8 inch in 96 inches horizontal variation from a true plane. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Coordinate finish carpentry with materials and systems in or adjacent to standing and running trim and rails. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.

E. Preservative-Treated Lumber: Where cut or drilled in field, treat cut ends with preservative solution used in original treatment by brushing, spraying, dipping, or soaking.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

3.4 INSTALLATION, SCOPE

A. Interior Architectural Woodwork including, but not limited to:

1. Repairing/replacing all damaged and deteriorated interior wood elements including all interior wood paneling, mouldings, trim, doors, door surrounds, chair and picture rail and all other wood details

2. Restore finish on original woodwork above to match original finish and sheen.

3.5 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 36 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, if required.

1. Match color and grain pattern across joints.
2. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
3. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.
4. Install standing and running trim with no more than 1/8 inch in 96-inch variation from a straight line.

3.6 PANELING INSTALLATION

A. Board Paneling: Install according to manufacturer's instructions. Arrange in patterns according to drawings, to match original designs.

1. Install in full lengths without end joints.
2. Install with uniform end joints with only end-matched (tongue-and-groove) joints within each field of paneling.
3. Fasten paneling to substrate by face nailing, setting nails, and filling over nail heads.

3.7 RESTORATION OF DOOR WOODWORK

A. Wood Door and Frame Woodwork:

1. Remove all interior finishes from door woodwork. Use chemical stripping system capable of being neatly controlled to avoid damage to any other surrounding surfaces. Collect and contain all residues, and dispose of them in a proper and legal manner.

   a. Do not use heat guns, sanders, or other methods to strip wood, which might cause lead compounds in the paints to be dispersed into the environment.

   b. Paints shall be removed only in solubilized or plastic state. Do not scrape or sand brittle residues. Remove residues by hand with sponge and water. If water spraying

is used, the Contractor must provide a containment system to prevent residues from contaminating adjacent materials, soil and plant life.

c. After all paint residues have been removed, thoroughly rinse and neutralize all wood to remove all traces of stripping compounds, and properly prepare wood for repainting.

5. Remove all exterior caulking in joint between outer window and balcony and veranda door frame and masonry opening. (See Section 07900 – Joint Sealers).

6. Replace missing, severely deteriorated and weathered, and rotted wood with new wood members or glued-in-place dutchmen of matching species and appearance. Submit samples to Architect prior to installation.

   a. Dutchman Preparation: Do not remove existing sound wood, except to allow for keying-in of new replacement wood. Such removal shall be held to a minimum and shall conform to the standard set by the approved sample. The Architect shall be the final judge as to the amount of wood to be removed.

   b. Reconstruct damaged and deteriorated moldings, stiles, rails, jambs, stops, parting beads, trim, etc. to match existing original members in all details. Fabricate joinery to match original.

7. Consolidate and restore weakened wood using low-viscosity, epoxy-based, impregnating liquid by brush to refusal, such as Stainable Abatron LiquidWood. Restore small missing areas (which were originally painted) with epoxy-based paste filler/adhesive such as Abatron WoodEpox, or Architect-approved equal. Shape and sand to match original proportions, dimensions, profiles and contours. Fill all nail holes and similar minor losses with compatible commercial wood filler formulated for use under the conditions in which it is installed.

8. Minor surface defects and cosmetic damage shall be filled, shaped, sanded and refinished according to the standard set by the approved sample. Note: A certain amount of imperfections will be acceptable, as existing window and door woodwork may retain a semblance of their age after restoration.

9. Apply wood preservative treatment to all members before priming. Include field cuts and fittings.

10. Prime all wood to receive opaque finish coatings with one coat of penetrating oil-based primer. (See Section 09900 – Painting).

3.8 ADJUSTING

A. Repair damaged or defective woodwork where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

3.9 CLEANING

A. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

3.10 FINISHING

A. Complete the finishing work specified in this Section, to the extent not completed at the shop or before installation. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in the shop.

3.11 PROTECTION

A. Provide final protection and maintain conditions that ensure woodwork is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 06102

SECTION 06300 - WOOD FLOOR RESTORATION

PART 1 - GENERAL

1.1 SUMMARY

A. The objective of this wood floor restoration specification is to expose, preserve, and restore and replicate missing elements of the wood floors as shown on the Contract Drawings to match original at the interior of the New London City Hall.

B. The work of this Section consists of providing all labor, materials, equipment and services to complete wood floor restoration. The work may include, but is not limited to:

1. Remove existing vinyl tile, carpet and other coverings to expose the original wood flooring where indicated on the drawings.

2. Remove all unused nails and abandoned anchors.

3. Replace missing original and heavily deteriorated wood with new wood to match existing as required.

4. Replace missing/refinish existing baseboards as necessary.

5. Sand down to bare wood, stain and refinish existing wood floors and wood thresholds in work areas and abutting work areas to match historic finish. Care must be taken to ensure that the minimum amount of wood is lost when sanding down the floors.

C. Related Sections:

1. Section 03400 – Tile Flooring Restoration
2. Section 06200 – Architectural Woodwork Restoration

1.2 REFERENCES

A. Materials and methods shall conform to the Secretary of the Interior's Standards. All work shall comply with the United States Secretary of the Interior Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, 1995, unless indicated otherwise.

B. Hardwood Flooring: Comply with National Wood Flooring Association's NWFA/NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.

C. Work shall meet or exceed the National Wood Flooring Association's industry guidelines including Installation Guidelines and Sand and Finish Guidelines.

D. Materials shall conform to the latest edition of reference specifications applicable, specified herein, and to applicable codes and requirements of local authorities having jurisdiction.

1. Materials shall conform to governing regulations regarding the content of volatile organic compounds (VOC).
2. The Contractor shall confirm that the materials specified perform to the satisfaction of the Architect, and do not produce off-gassing or otherwise have a deleterious effect during or after application on either the surface being treated or on adjacent surfaces.

E. The Contractor shall comply with relevant ASTM Standards for all Materials.

F. Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS).

1.3 JOB CONDITIONS

A. The Contractor shall take extreme care in protecting the surrounding materials. It is the Contractor's responsibility to ensure that protective measures are in place and are adequate for the work being performed.

B. Conditioning period for wood shall begin not less than seven (7) days before wood flooring installation, is continuous through installation, and continues not less than seven (7) days after wood flooring installation.

1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 degrees Fahrenheit and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
   a. Do not install wood flooring until it adjusts to relative humidity of, and is at the same temperature, as the space where it is to be installed.
   b. Open sealed packages to allow wood flooring to acclimatize immediately upon moving flooring into spaces in which it will be installed.
3. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

C. Contractor shall take all necessary precautions to prevent fire and spread of fire.

D. Contractor shall provide for adequate ventilation at all times during the work of this section.

E. Working fire extinguishers must remain on the worksite at all times.

F. Paint or solvent soaked rags, waste, overalls or other material which might constitute a fire hazard shall be placed in metal containers and be removed from the premises daily in accordance with the Construction Manager's requirements for waste removal.

G. Any damage made to the building elements by the scaffolds or other access equipment will be repaired by the Contractor to the satisfaction of the Architect at no cost to the Owner.

1.4 SUBMITTALS

A. Qualification Data: Submit qualification data, specified in "Quality Assurance" Article, that demonstrate the firm's and individual's capabilities and experience. Include a list of at least three (3) wood floor restoration projects completed in a timely fashion in landmark quality buildings. List project names, addresses, names of Owner's Representative and Owner, and telephone number of contact person for each project.

B. Product Literature: Submit three (3) copies of manufacturer's latest published technical data including, installation instructions and general recommendations for each specified material and fabricated product. Include test reports and certificates substantiating the products compliance with the specified requirements. Obtain approval before materials are delivered to the site.

C. Methods of Protection: Prior to commencing the protection and restoration, the Contractor shall submit a written description of proposed materials and methods of protection for preventing damage to any adjacent material or finish during the restoration and installation of the wood floors.

D. Scope of Work: The Contractor shall submit a written description of the proposed scope of work and the proposed method for restoring each area of wood floor.

E. Submit one (1) sample of wood for each type of wood flooring, with finish required approximately 12 inches long and of the same thickness and material indicated for the work and showing the range or normal color and texture variations expected.

F. Submit (1) sample of each material required for protection including:

1. Polyethylene sheeting
2. Low-tack masking tape
3. Plywood 1/4" to 3/4" thick

G. Submit Material Safety Data Sheets for each material required for cleaning including:

1. Cleaning pads
2. Steel wool, 0000
3. Paint stripper

H. Submit Material Safety Data Sheets for each type of putty, adhesive and fasteners to be used on site including:

1. Wood fillers
2. Adhesives
3. Screws and other fasteners
4. Nails and brads

I. Submit Material Safety Data Sheets for each type of finish material to be used including:

1. Paint and Varnish Removers
2. Retouching Crayons
3. Sanding Sealer
4. Stains
5. Varnishes

J. Prepare Mock-ups for approval as specified in Section 1.5 "Mock-ups."

K. Samples and mock-ups submitted which are approved by the Architect shall remain as a record at the site until all work is completed and approved by the Architect.

1.5 QUALITY ASSURANCE

A. Skill: The "Restoration Carpenter" (heretofore known as the Contractor) who shall perform the work specified in this section must be regularly engaged in the restoration of historic wood floors. The Contractor must demonstrate successful completion within the last three (3) years and in a timely fashion at least three (3) projects similar in scope and type to the required work in the CT/NY/NJ Metropolitan region involving landmark quality buildings. For the wood floor restoration, use craftspeople who are familiar with the requirements for this work.

B. Foreperson: Foreperson shall submit a resume demonstrating a minimum of five (5) years of experience restoring historic wood floors. The foreperson shall speak and read fluent English.

C. Bidders must visit the site beforehand and make themselves thoroughly familiar with specific conditions relating to this Section.

D. Mechanics: Contractor shall maintain a steady work crew consisting of skilled craftspeople that are experienced with the materials and methods specified. The Contractor shall conform that all workers understand the job's requirements.

E. Foreperson shall be present on site daily, and whenever work is being performed.

F. All Subcontractors are bound by the same requirements as the Contractor. Subcontractor shall not begin work unless approved by the Architect.

G. Source Limitations: For all replacement flooring and new replicated pieces, obtain each species, grade and cut of wood from one source with resources to provide materials and products of consistent quality in appearance and physical properties.

H. All wood restoration procedures shall be done in accordance with regulations, safety standards and in requirement of all federal state and local authorities having jurisdiction over the work including but not limited to the applicable standards for protecting the public and control of pollutants and OSHA regulations for the protection of workers and the public.

I. Whenever possible, use old growth salvaged wood for replacement rather than new.

J. Wood Moisture Content: If using new wood, provide kiln-dried (KD) lumber with an average content range of 6-11%.

K. Replication wood shall match original existing species and grade, or premium grade whichever is more stringent. New inserts in existing wood shall be selected to match grain, color and pattern.

1.6 MOCK-UPS

A. The following mock-ups are to be performed and approved prior to the start of work. The approved mock-ups may be retained and incorporated into the final work.

1. Tile/Carpet and overlayment removal, including the removal of wood tacking strips. Mock-up to be four (4) feet by four (4) feet square.
2. Removal of abandoned anchors or nails. Mock-up to be one (1) foot by one (1) foot.
3. Reattachment of loose element: prepare one (1) sample using stainless steel fasteners.
4. Sanding the floor prior to refinishing. Sample to be at minimum three (3) foot by three (3) foot square.
5. Removal of damaged floors: Contractor shall remove a section of damaged flooring to ensure adjacent flooring is not damaged during removal.
6. New wood inserts: Subsequent to the Architect's approval of all shop drawings/sketches and samples, the Contractor shall prepare one sample to demonstrate skill of inserting new pieces with a tight fit into the existing floors to remains.
7. Finish Restoration: Prepare three (3) samples using materials and methods specified for each type of finish. The new finish shall match the historic finish in color, transparency and reflectance quality. Following any revisions requested by the Architect, the approved sample shall form a quality standard for all other work.

B. All finish mock-ups will be a minimum of 3′ X 3′ except where specifically approved by the Architect.

C. Mock-ups shall be approved by the Architect before any work may proceed. Provide additional sample panels, as may be required by the Architect. The approved panels shall not be removed until so directed by the Architect.

D. No work will be accepted until it conforms in every respect to the finished samples.

E. Protect mock-ups for the duration of the job. Samples and mock-ups submitted which are approved by the Architect shall remain as a record at the worksite until the work is completed and approved by the Architect. Approved mock-ups can be incorporated into the final work of this Section. Mock-ups shall serve as a standard for the acceptance or rejection for the work of this contract.

1.7 PROTECTION

A. Take all necessary precautions to protect all persons (whether engaged in the work of this Section or not) from all hazards of any kind associated with the work of this Section.

B. Take all necessary precautions to protect all property and materials (whether subject to the work of this Section or not) from any harm or damage associated with the work of this Section.

C. Perform all work of this Section in accordance with all Federal, State and local regulations regarding the transportation, storing, handling, application, removal and disposal of the products involved.

1.8 MATERIAL DELIVERY, STORAGE AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture.

C. Store wood flooring materials in a dry, warm, ventilated, weather-tight location.

D. Deliver packaged materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and name of product and manufacturer.

E. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from moisture damage.

F. Arrangement shall be made with the Owner to store equipment and materials in designated areas. The Owner shall not be responsible for damaged or stolen materials or equipment left on the premises by the Contractor.

G. Replace all broken, lost or damaged adjacent material resulting from repair, removal, cleaning of finishing of all woodwork under this section at no expense to the Owner.

PART 2 - MATERIALS

2.1 GENERAL REQUIREMENTS

A. Where any manufacturer makes more than one grade of each material specified, the Contractor shall use the highest grade of each type, whether or not the materials is mentioned by trade name in these specifications.

B. Follow manufacturer's instructions regarding preparation of surfaces, mixing, applying, drying, etc. In case of conflict with this specification, the more stringent shall govern.

C. Materials, except salvaged wood, shall conform to the following requirements and shall be new, of the highest grade, free from defects, and of recent manufacturer. Where product names and numbers are indicated and are not available, furnish products which are equal to original specifications, as approved and at no additional cost to the Owner.

D. Work that is to be finished shall be free from defects or blemishes on surfaces exposed to view that will show after the finish coat of varnish is applied. Any materials which are in any way defective and do not meet specifications for quality and grade or are otherwise not in proper condition shall be rejected.

2.2 TOOLS

A. Power saws (oscillating) may be used during the removal of wood flooring upon approval by the Architect.

B. Hand-held power tools to be used for the removal of paint or varnish shall be equipped with vacuum attachments that control air-born dust.

C. Pneumatic nailers can be used for installing any new wood flooring.

D. Mallet.

E. Rotary or Orbital sander or buffer, with a vacuum attachment.

F. Chisel hand tools.

G. Miter saw.

H. Steel edge square or guide.

I. Stainless steel straight blade scraper.

2.3 FIELD-FINISHED WOOD FLOORING

A. Solid-wood, flooring. Kiln dried to 6 to 9 percent maximum moisture content.

1. Species and Grade: Match existing wood strip flooring, including but not limited to selection from Yellow Pine.
2. Cut, plain sawn.
3. Tongue and Groove
4. Thickness: To match existing.
5. Face Width: To match existing.
6. Lengths: Random-length strips to match existing complying with applicable grading rules.

2.4 ACCESSORY MATERIALS

A. Fasteners: As recommended by manufacturer, but not less than that recommended in National Wood Flooring Association's "Installation Guidelines: Wood Flooring."

2.5 CLEANING MATERIALS

A. Cleaning Pads: Scotch-Guard Red Pads, or approved equal.

B. Cleaning Pads: 0000 steel wool, clean, and free of contaminants and corrosion.

C. Clean, lint-free cotton rags and cheesecloth.

2.6 FILLERS

A. Fillers for nail holes and small losses in wood: Fillers to be compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved samples, provide pigmented filler.

B. Acceptable products include:

1. Pencils. Colors to match Minwax Wood Finish in 2718 "Ebony":
   a. Minwax Blend-Fil Pencil in color #9 as manufactured by Minwax Company 10 Mountainview Road, Upper Saddle River, NJ 07458 Tel: 800-290-1105.
   b. Mohawk Blendal Sticks as supplied by Woodshop Products, LLC 4262 West Riverbend Avenue Post Falls, ID 83854 Tel: 208-777-9663.
   c. DAP Blend Sticks by Plastic Wood as supplied by Grainger 308 Allwood Road Clifton, NJ 07012 Tel: 973-777-7700.
   d. Or approved equal.
2. Wood Putty. Stainable or colors to match Minwax Wood Finish in 2718 "Ebony":
   a. Minwax Wood Putty as manufactured by Minwax Company 10 Mountainview Road, Upper Saddle River, NJ 07458 Tel: 800-290-1105.
   b. Mohawk Epoxy Putty Sticks as supplied by Woodshop Products, LLC 4262 West Riverbend Avenue Post Falls, ID 83854 Tel: 208-777-9663.
   c. Dap Plastic Wood, Wood Filler as supplied by Grainger 308 Allwood Road Clifton, NJ 07012 Tel: 973-777-7700.
3. Or approved equal.

2.7 FINISHING MATERIALS

A. Stain: All new flooring and replacement units are to be stained or varnished to match the historic floor pieces. If older pieces have been sanded down below the stain, the old floor pieces are to be stained to match the original color. Stains are to provide uniform color or colors for the flooring.

B. Finish System: Complete system of compatible materials for application indicated. One coating of oil-based stain topped with three coats of waterborne polyurethane varnish for an abrasion resistant finish.

1. Oil-based Stain
   a. Sherwin William's Wood Classics 250 VOC Interior Oil Stain as manufactured by Sherwin Williams Company.
   b. Minwax Wood Finish as manufactured by Minwax Company
   c. Cabot Penetrating Interior Oil Based Wood Stain as manufactured by Cabot

d. Or approved equal.

2. Varnish: Finish Satin
   a. Sherwin Williams Wood Classics Waterborne Polyurethane Varnish
   b. Minwax Ultimate Floor Finish
   c. Cabot Interior Oil-Based Polyurethane
   d. Or approved equal.
   e. Finish: Satin.
3. System: Three finish coats, formulated for multi-coat application on wood flooring.
4. Products: Subject to compliance with requirements, provide products by the following companies or approved equals.
   a. Sherwin Williams Company Tel: 800-474-3794 www.sherwin-williams.com.
   b. Minwax Company 10 Mountainview Road, Upper Saddle River, NJ 07458 Tel: 800-290-1105.
   c. Cabot 100 Hale Street Newburyport, MA 01950 Tel: 800-877-8246.
   d. Or approved equal.

C. Stain to match the following color as per Jablonski Building Conservation Kip's Castle Interior Finishes Investigation report dated May 2014:

1. Sherwin Williams 3123 "Oak Mantle"

2.9 PROTECTION MATERIALS

A. Kraft Paper.

B. Low-tack masking tape: 3M or approved equal.

C. Plywood: ¼" to ¾" thick.

D. Masonite Board.

PART 3 - EXECUTION

3.1 INSPECTION

A. The Contractor shall examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

1. Verify that substrates comply with tolerances and other requirements specified in other Sections.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Take all necessary field measurements and verify all installation conditions prior to dismantling, submission of shop drawings/sketches and other submittals, and prior to ordering and fabrication of materials.

3.2 PREPARATION

A. Broom or vacuum clean substrate to be covered immediately before product installation. After cleaning, examine substrate for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 RESTORATION OF WOOD FLOORING: GENERAL

A. Restore all wood flooring, including specific items noted on the drawings, using methods specified in this section. Restoration work includes all necessary repair work to return wood floor to intact and structurally sound condition acceptable to the Architect and is not limited to specific items noted on the Drawings.

3.4 REMOVAL OF TILE, CARPET OVERLAYS, PADS, AND TACKING STRIPS

A. Gently remove all vinyl tile, carpet, overlays, pads and tacking strips without damaging the historic floor below.

1. Begin at a corner of the carpet by running a standard screwdriver or 5 in 1 tool between the wall and the carpet gently lifting the corner.
2. Pry up the carpet from the tacking strip below.
3. Pull back the carpeting until the entire rug can be rolled up and removed.
4. Pull up and remove foam pad. If pad is secured using staples, use a pair of pliers to remove all staples.
5. Remove the carpet tacking strips which may be nailed or stapled to the hardwood floor.
   a. Starting at the edge of the tack strip, gently slide the pry bar or 5 in 1 under the strip and carefully pry the strip from the hardwood taking care not to gouge the hardwood below.
   b. Use pliers to pull up any nails or staples that remain in the hardwood floor.

B. Properly dispose of carpet, pads, strips and fasteners off-site.

3.5 REMOVAL AND REPLACEMENT OF WOOD

A. Remove deteriorated, spongy, split or non-original wood flooring as required and replace with new units which match existing in size, shape, species and finish.

B. Removal of deteriorated wood:

1. Using a spade bit and electric drill, bore pairs of holes with a 3/4" (2cm) diameter at the ends of the boards to be removed.
2. With the cut depth on a oscillating saw set equal to the flooring's thickness, make plunge cuts between the holes.
3. Gently pry out the strip between the cuts and the groove-edge piece. To pry away the remaining strip, which is nailed through its tongue, drive a chisel into the strip at its center, angled away from the adjacent strip. With the

tongue and groove held apart, use a pry bar to carefully pull out the strip. Ensure that adjacent wood is not damaged during removal.

4. Crosscut at cut lines with an oscillating saw, using a plunge cut as necessary. Guide all crosscuts with a square or straightedge to ensure all cuts are square.
5. Complete the cut by driving a sharp chisel into the saw kerf with the flat side of the chisel against the cut line.

C. Installation of replacement unit:

1. Install the first strip's tongue over an exposed groove. Cut the strip to length from the tongue end. Guide all crosscuts with a measuring square or use a miter saw.
2. Tap in the strip with a mallet, then blind-nail (at an angle) spiral flooring nails into the tongue so that they will be hidden from view. To avoid damaging the wood, sue a nail set to drive the nail the last 1/4" (6mm).
3. For single strip or last strip, cut the bottom lip of the tongue off the side and the end, and then cut to length. Tilt the strip to insert its tongue into the existing groove. Nail down the strip's face and countersink the head with a nail set.

D. Preparation for refinishing:

1. Sand the replacement strips and the strips immediately adjacent to them using a belt sander with 60-grit belts until the joint is smooth to the touch. Always sand with the grain.
2. Continue sanding with 80-grit ad 100-grit belts and move onto a 120-grit disks on a random-orbit sander.
3. Finish with sand-sanding block to sand up to the edges of all un-sanded adjacent strips.

E. Refinish as per section 3.8 Refinishing.

3.6 REMOVAL/REATTCHING LOOSE TRIM

A. Remove and reattach all existing base moldings and replace missing sections of base moldings with new to match original.

B. Using galvanized nails that will penetrate at least ½" into the backing material, drive nail into trim without hitting the wood.

C. Drive nail until the head is slightly above the surface of the wood. Then hold the tip of a nail set against the nail head and tap with a hammer to drive the head about 1/8" below the surface of the wood.

D. Fill resulting hole with wood filler that matches surrounding finish.

3.7 REFINISHING

A. Refinishing consists of either selective refinishing, which is the removal of the top finishes, and major refinishing, which will require the removal of all existing finishes from the wood floor and the application of new finishes.

1. General
    a. All surfaces shall be properly prepared to receive finishes including thorough cleaning of all grime, grease, dirt, loose material and other substances that may interfere with proper adhesion of finish. All surfaces to be finished shall be dry. If using chemical strippers, allow several days for the wood surfaces to dry after stripping procedures.
    b. The starting of the work of this section will be construed as acceptance of such surfaces as being satisfactory, and any defects of this work resulting from such accepted surface will be corrected by the Contractor at his own expense.
    c. Remove all imperfections in the previous coat before the subsequent coat is applied.
    d. Provide protection sufficient to protect adjacent work and materials.
2. Selective Refinishing
    a. Sand/remove upper finish surface in rooms noted on Contract Drawings using a rotary or orbital buffer.
    b. Apply floor finish materials in number of coats recommended by finish manufacturer for application indicated to achieve a uniform appearance.
3. Complete Refinishing
    a. The Contractor shall remove the damaged wood finish to bare wood using a machine-sander equipped with a vacuum attachment to remove offsets, ridges, cups, raised grain and sanding-machine marks that would be noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish. The sanding should be kept to a minimum to ensure retention of historic fabric.
    b. Comply with applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring."
4. Fill open-grained hardwood.
5. Fill and repair wood flooring seams and defects.
6. Apply oil-based stain colors per manufacturer's instructions.
    a. Colors to match existing exposed original.
7. Apply three coats of waterborne polyurethane varnish as per manufacturer's instructions.

B. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.8 STAIN COLOR APPLICATION

A. Stain colors are to be based on existing stain color once areas of original wood flooring are exposed.

B. All stained flooring shall be topped with three applications of a clear polyurethane varnish.

3.9 CLEAN UP

A. The Contractor shall leave the site free of all debris at the end of the working day.

B. Work and adjacent areas shall be clean and free of all loose materials and debris.

C. All wood surfaces shall be cleaned of dust, grime, and other substances following repairs using a clean damp cloth.

3.10 PROTECTION

A. After full cure of finishes, protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film which may cause condensation.

B. Do not move heavy or sharp objects over kraft paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 06100

SECTION 07840 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Sections:

1. Section 07844 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at wall/floor intersections, and in smoke barriers.

1.3 ACTION SUBMITTALS

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

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified

requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

   a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
   b. Classification markings on penetration firestopping correspond to designations listed by the following:

      1) UL in its "Fire Resistance Directory."

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A/D Fire Protection Systems Inc.
2. Grace Construction Products.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. 3M Fire Protection Products.
7. Tremco, Inc.; Tremco Fire Protection Systems Group.
8. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is 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. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Horizontal assemblies include floors and floor/ceiling assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

   a. Slag-wool-fiber or 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. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

D. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

F. 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.

G. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping 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 the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with 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 penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. 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 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 penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming 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 firestopping.

C. Install fill materials for firestopping 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Manufacturer's name.
   6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping 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 penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 07840

SECTION 07844 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

B. Related Sections:

1. Section 07840 - Penetration Firestopping.

1.3 ACTION SUBMITTALS

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

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to

Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:

   a. Fire-resistive joint system products bear classification marking of qualified testing agency.
   b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:

      1) UL in its "Fire Resistance Directory."

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint 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 assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls, floor, or floor/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. A/D Fire Protection Systems Inc.
    b. CEMCO.
    c. Fire Trak Corp.
    d. Grace Construction Products.
    e. Hilti, Inc.
    f. Johns Manville.
    g. Passive Fire Protection Partners.
    h. RectorSeal Corporation.
    i. Specified Technologies Inc.
    j. 3M Fire Protection Products.
    k. Tremco, Inc.; Tremco Fire Protection Systems Group.
    l. USG Corporation.

C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.

1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. A/D Fire Protection Systems Inc.
    b. Grace Construction Products.
    c. Hilti, Inc.
    d. Johns Manville.
    e. Nelson Firestop Products.
    f. NUCO Inc.
    g. Passive Fire Protection Partners.
    h. Specified Technologies Inc.
    i. 3M Fire Protection Products.
    j. Tremco, Inc.; Tremco Fire Protection Systems Group.
    k. USG Corporation.

D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Low-Emitting Materials: Fire-resistive joint system sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. 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 fire-resistive joint 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 fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in 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 fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07844

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. Work: Joint sealing work described herein includes the following:

1. Joint preparation.
2. Backer rod installation.
3. Sealant installation.

B. Extent and Location: Sealant shall be applied where necessary to achieve watertightness and at the following specific components:

1. At all window and door frame perimeters.
2. At coping stone transverse joints.
3. At miscellaneous locations where shown on the drawings and directed by the Architect.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 04500 - Masonry Restoration

1.4 SUBMITTALS

A. **Product Data**: Submit four sets of Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

B. **Samples**: Submit four sets of samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing.

1.5 QUALITY ASSURANCE

A. **Single Source Responsibility for Joint Sealer Materials**: Obtain joint sealer materials from a single manufacturer for each different product required.

B. **Standards**: Sealant installation shall comply with ASTM C 962-86 "Standard Guide for Use of Elastomeric Sealants".

1.6 DELIVERY, STORAGE AND HANDLING

A. **Delivery**: Deliver materials to project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. **Storage**: Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. **Environmental Conditions**: Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

2. When joint substrates are wet due to rain, frost, condensation, or other causes.

B. **Joint Width Conditions**: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. **Joint Substrate Conditions**: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. **Colors**: Provide color of exposed joint sealers as selected by Architect from manufacturer's standard colors.

B. **Joint Sealants**:

1. Sikaflex - 15LM low modulus non-sag elastomeric, single component polyurethane sealant, as manufactured by Sika Corporation, (201) 933-8800, or approved equal.

C. **Backer Rod and Filler**:

1. For polyurethane sealant: Sonofoam closed cell backer rod as manufactured by Sonneborn, (612) 835-3434, and as approved by sealant manufacturer.

D. **Joint Primer**: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealer/substrate tests and field tests.

E. **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.

F. **Cleaners for Non-porous Surfaces**: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent non-porous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

PART 3 - EXECUTION

3.1 PREPARATION

A. **Surface Cleaning of Joints**: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealers, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean masonry and similar porous joint substrate surfaces, by brushing, or mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Clean metal, glazed surfaces of brick and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

4. Cleaning of all surfaces shall be performed on the same day in which the sealant is applied. Use only solvents recommended by the manufacturer. Cleaning solvents shall not be allowed to air dry or evaporate without wiping. Solvents, when used, shall be wiped dry with a clean cloth or lintless paper towels.

B. **Joint Priming**: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer 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 which otherwise would be permanently stained or damaged by such contact, or by cleaning methods required to remove sealant smears. Masking tape is also recommended where appropriate to ensure a neat job. Remove tape immediately after tooling and before the sealant begins to cure without disturbing joint seal.

3.2 JOINT SEALANT INSTALLATION PROCEDURES

A. **General**: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. **Elastomeric Sealant Installation Standard**: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

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 and depths of installed sealants relative to joint widths which allow optimum sealant movement capability. As a guideline joint depth shall be .4 x joint width.

2. Do not leave gaps between ends of joint fillers.

3. Do not stretch, twist, puncture, or tear joint fillers.

4. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

5. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

6. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

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 which allow optimum sealant movement capability.

E. **Tooling of Nonsag Sealants**: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated on the drawings, 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, which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

F. **Masking Tape**: Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.3 CLEANING

A. **Excess Sealant**: Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.4 PROTECTION

A. **Contamination**: Protect joint sealers 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 sealers immediately and installations with repaired areas indistinguishable from original work.

3.5 GUARANTEE

The Contractor guarantees to the Owner that said Contractor shall be responsible for any defective materials and workmanship installed by him for a period of five years. The period of guarantee shall start from the date of Owner acceptance of the work. The Contractor further guarantees to provide all necessary access provisions and to perform permanent repairs forthwith to restore the defective areas, and to make permanent repairs without reference to or consideration of the cause of any defects in the work.

END OF SECTION 07900

SECTION 08111 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes the installation of fire rated hollow-metal doors and frames where indicated on the drawings.

B. Related Requirements:

1. Section 08710 - Door Hardware

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.

6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Ceco Door Products; an Assa Abloy Group company.
2. Commercial Door & Hardware Inc.
3. Concept Frames, Inc.
4. Curries Company; an Assa Abloy Group company.
5. Custom Metal Products.
6. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Commercial Doors and Frames: NAAMM-HMMA 861.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches.
   c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
   d. Edge Construction: Continuously welded with no visible seam.
   e. Core: Steel stiffened.

3. Frames:

   a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch for door openings 48 inches or less, or window frames; minimum thickness of 0.067 inch for door openings greater than 48 inches.
   b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Section 088000 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Fire Door Cores: As required to provide fire-protection ratings indicated.
3. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
4. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
5. Bottom Edge Closures: Close bottom edges of doorswith end closures or channels of same material as face sheets.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

   a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

      1) Two anchors per jamb up to 60 inches high.
      2) Three anchors per jamb from 60 to 90 inches high.
      3) Four anchors per jamb from 90 to 120 inches high.

4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches high.

c. Compression Type: Not less than two anchors in each frame.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

7. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.8 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch- (0.5-mm-) thick, cold-rolled steel sheet set into 0.032-inch- (0.8-mm-) thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other.
3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.

8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

   a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
   c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
   d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08111

SECTION 08141 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core panel style wood doors at toilet rooms and mechanical closets as indicated on the drawings.
2. Factory finishing of doors as indicated.

B. Related Requirements:

1. Section 06200 - Architectural Woodwork
2. Section 08800 - Glazing

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site

1.4 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For plastic-laminate door faces and factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Plastic laminate, 6 inches square, for each color, texture, and pattern selected.
3. Corner sections of doors, approximately 8 by 10 inches , with door faces and edges representing actual materials to be used.

    a. Provide Samples for each species of veneer and solid lumber required.
    b. Provide Samples for each color, texture, and pattern of plastic laminate required.
    c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.

4. Louver blade and frame sections, 6 inches long, for each material and finish specified.
5. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that [is certified for chain of custody by an FSC-accredited certification body] [and] [is a certified participant in AWI's Quality Certification Program] [is a licensee of WI's Certified Compliance Program].

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Exterior Doors: Five years from date of Substantial Completion.
4. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Century Woodworking, LLC; 40 River Road, Pleasant Valley, CT 06063; Steve McLaughlin, smclaughlin@centurywoodworking.com; 860-379-7538 or Architect approved equal.

B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling and wood paneling from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. Regional Materials: Flush wood doors shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

C. Regional Materials: Flush wood doors shall be manufactured within 500 miles (800 km) of Project site.

D. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

E. WDMA I.S.1-A Performance Grade: Heavy Duty

F. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, and where indicated.

G. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.3 SOLID-CORE PANEL STYLE WOOD DOORS

A. Interior Solid-Core Doors
1. Style: Shaker Style (5) panel door with (2) acid etched tempered glass panels over (3) flat recessed veneer core panels at Toilet Rooms and (5) panel door with flat recessed veneer core panels at Mechanical Closets.
2. Material: Plain cut White Oak stiles and rails with veneer core panels.
3. Finish: Split finish with primed one side and stained finish per clients approved color sample
4. Jambs up to 6-7/8" deep jambs with compression weather-stripping.
5. Casing: up to 6" wide flat casing at both sides of each door unit.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

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, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

1. Fabricate door and transom panels with full-width, solid-lumber, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.5 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099123" Interior Painting."

B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing." Seal edges of cutouts and mortises with first coat of finish.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on[top and] bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Factory finish doors that are indicated to receive transparent finish.

D. Factory finish doors where indicated in schedules or on Drawings as factory finished.

E. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Transparent Finish:

1. Grade: Custom.
2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" [System 10, UV curable, water based or System 11, catalyzed polyurethane

3. Finish: WDMA TR-4 conversion varnish or WDMA TR-6 catalyzed polyurethane
4. Staining: Match Architect's sample
5. Effect: Filled finish
6. Sheen: Satin

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.
2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

   a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08141

SECTION 08311 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames for ceilings.
2. Access doors and frames for floors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Access Panel Solutions.
2. Acudor Products, Inc.
3. Babcock-Davis.
4. Cendrex Inc.
5. Milcor Inc.
6. Architect Approved Equal.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Flush Access Doors with Exposed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling.
3. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.

    a. Finish: Factory prime.

4. Frame Material: Same material, thickness, and finish as door.
5. Hinges: Manufacturer's standard.
6. Hardware: Latch.

D. Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame, uninsulated. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage.

    a. Finish: Factory prime.

5. Frame Material: Same material, thickness, and finish as door.
6. Hinges: Manufacturer's standard.
7. Hardware: Latch.

E. Hardware:

1. Latch: Cam latch operated by screwdriver.

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.

F. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.

G. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

H. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

I. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2 (ANSI H35.2M).

J. Frame Anchors: Same type as door face.

K. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces 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.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
3. Provide mounting holes in frames for attachment of units to metal or wood framing.
4. Provide mounting holes in frame for attachment of masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08140 - WOOD-FRAMED GLASS DOORS AND TRANSOMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood interior aluminum-clad exterior hinged wood-framed glass entrance doors.
2. Fixed round top wood interior aluminum-clad exterior transom window above entrance doors.

B. Related Requirements:
1. Section 08710 - Door Hardware.
2. Section 09900 - Painting.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of hinged wood-framed glass door.

1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.

B. Shop Drawings: For hinged wood-framed glass doors and fixed transom.

1. Include plans, elevations, sections, and details.
2. Detail attachments to other work, and between units, if any.
3. Include hardware and required clearances.

C. Samples: For each type of hinged wood-framed glass door and transom and for each color and texture specified, 12-inch-long section with weather stripping, glazing bead, and factory-applied color finish.

D. Samples for Initial Selection: For doors with factory-applied color finishes.

1. Include Samples of hardware and accessories involving color selection.

E. Samples for Verification: For hinged wood-framed glass doors and components required, prepared on Samples of size indicated below:

1. Main Framing Member: 12-inch-long section with weather stripping, glazing bead, and factory-applied color finish.
2. Glazing: 12″ X 12″ samples.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Product Test Reports: For each hinged wood-framed glass door, for tests performed by a qualified testing agency; and for each class and performance grade indicated, tested at AAMA gateway size.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes, weather stripping, operable panels, and operating hardware to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating hinged wood-framed glass doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

B. Installer Qualifications: An installer acceptable to hinged wood-framed glass door manufacturer for installation of units required for this Project.

1.8 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace hinged wood-framed glass doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection.
c. Excessive water leakage or air infiltration.
d. Faulty operation of movable panels and hardware.
e. Deterioration of wood, metals, vinyl, and other materials and finishes beyond normal weathering.
f. Failure of insulating glass and laminated glass.

2. Warranty Period:

   a. Hinged Door: Five years from date of Substantial Completion.
   b. Insulating Glass: Ten years from date of Substantial Completion.
   c. Laminated Glass: Five years from date of Substantial Completion.
   d. Metal Finish: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain hinged wood-framed glass doors and transom from the following manufacturer or Architect approved equal:

   1. Bieber Windows and Doors; 89 Wolfs Lane, Pelham, NY 10803, 646-884-1019; www.bieber-windows.com; Contact; Benoit Luys

2.2 PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

   1. Product Certification: AMMA certified with label attached to each door.

B. Windborne-Debris Resistance: Capable of resisting impact from windborne debris based on testing hinged wood-framed glass doors identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

2.3 ALUMINUM-CLAD HINGED WOOD-FRAMED GLASS DOORS AND TRANSOMS

A. Exterior Surfaces: Aluminum cladding with manufacturer's standard baked-on enamel finish.

   1. Color: Bronze as selected by Architect from manufacturer's custom full range.

B. Interior Surfaces: Manufacturer's standard factory-applied primer.

C. Wood Species: Scandinavian Pine.

D. Frames, Door and Transom Panels: Fabricate from wood components complying with indicated requirements. Provide factory-assembled panels with profile as indicated on the drawings.

E. Trim and Glazing Stops: Material and finish to match frame members.

F. Drip Caps: Extruded aluminum, factory fabricated and finished to match door frame; designed to direct water away from building when installed horizontally at head of hinged wood-framed glass doors.

2.4 GLAZING

A. Glass and Glazing: Manufacturer's standard glazing system that produces weathertight seal.

1. Glass: ASTM C 1036, Type 1, q3, Category II safety glass complying with testing requirements in 16 CFR 1201 for doors.
2. Safety Glazing Labeling: Permanently mark safety glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
3. Tint: Clear.
4. Insulating-Glass Units: ASTM E 2190, certified through IGCC as complying with requirements of IGCC].

    a. Filling: Fill space between glass lites with argon.
    b. Lites: Double pane.
    c. Low-E Coating: On outside pane of transom window and on inside and outside of safety glass on the doors.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with wood **and aluminum cladding** complying with AAMA 907; designed to smoothly operate, tightly close, and securely lock hinged wood-framed glass doors and sized to accommodate panel weight and dimensions.

1. GU Ferco with a special FerGUard protection or/and Roto Hardware with a special protection.

2.6 ACCESSORIES

A. Fasteners: Noncorrosive and compatible with door members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

B. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for hinged wood-framed glass doors, complying with ASTM B 456 or ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

1. Windborne-Debris Resistance: Provide anchors of same design used in windborne-debris resistance testing.

2.7 FABRICATION

A. Fabricate hinged wood-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

B. Fabricate hinged wood-framed glass doors that are reglazable without dismantling panel framing.

C. Weather Stripping: Provide full-perimeter weather stripping for each door panel unless otherwise indicated.

D. Factory machine hinged wood-framed glass doors for openings and hardware that is not surface applied.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

F. Factory-Glazed Fabrication: Glaze hinged aluminum-framed glass doors in the factory.

2.8 WOOD FINISHES

A. Factory-Applied Primer: Provide manufacturer's standard factory-applied prime coat complying with WDMA T.M. 11..

2.9 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: Bronze as selected by Architect from manufacturer's custom range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Work.

B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight hinged door installation.

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

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing hinged doors, hardware, accessories, and other components.

B. Windborne Debris Resistance: Anchor hinged wood-framed glass doors that have been tested for windborne debris resistance to structure using anchoring method, fastener type, and fastening frequency identical to that used in windborne debris resistance testing.

C. Install hinged wood-framed glass doors level, plumb, square, true to line; without distortion, warp, or rack of frames and panels, and without impeding thermal movement; anchored securely in place to structural support; and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction. Comply with ASTM E 2112.

D. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Test and inspect installed hinged wood-framed glass doors as follows:

1. Testing Methodology: Test hinged wood-framed glass doors for air infiltration and water resistance according to AAMA 502.
2. Air-Infiltration Testing:

    a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
    b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

    a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
    b. Allowable Water Infiltration: No water penetration.

C. Hinged wood-framed glass door will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Lubricate hardware and moving parts.

B. Adjust operating panels and screens to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and weathertight closure.

C. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.

D. Clean exposed surfaces immediately after installing hinged wood-framed glass doors. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess sealants, glazing materials, dirt, and other substances.

E. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

F. Protect hinged wood-framed glass door surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact hinged wood-framed glass door surfaces, remove contaminants immediately according to manufacturer's written instructions.

G. Refinish or replace hinged doors with damaged finishes.

H. Replace damaged components.

END OF SECTION 08140

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies requirements for finish hardware for new and existing doors where indicated on the drawings.

B. Related Sections:

1. Section 08111 – Hollow Metal Doors and Frames
2. Section 08141 – Flush Wood Doors
3. Section 08331 – Coiling Counter Doors
4. Section 08411 – Aluminum Framed Entrances

1.3 REFERENCES

A. The following is a listing of the publications referenced in this Section:

American National Standards Institute, Inc. (ANSI)/Builders Hardware Manufacturers Association, Inc. (BHMA)

A 156.1	Butts and Hinges.
A 156.2	Locks and Lock Trim.
A 156.3	Exit Devices.
A 156.4	Door Controls – Closers.
A 156.5	Auxiliary Locks.
A 156.8	Door Controls - Overhead Holders.
A 156.13	Mortise Locks and Latches.
A 156.18	Materials and Finishes.
A 117.1	Providing Accessibility and Usability of Physically Handicapped People.

Underwriters Laboratories Inc. (UL)

UL 228	Door Closers-Holders, With or Without Integral Smoke Detectors.
UL 437	Key Locks.

National Fire Protection Association (NFPA)

Standard No. 80 - Fire Doors and Windows.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Fire Rated Openings:

1. Provide hardware for fire-rated openings in compliance with NFPA No. 80 which has been tested and listed by UL Building Materials Directory or other nationally recognized independent testing, inspection and labeling agencies acceptable to the Engineer.

B. Closers and Holders:

1. Conform to requirements of ANSI A 156.4, Grade 1, and ANSI A 156.8 respectively.

2. Where door(s) shown on the Contract Drawings are required to be accessible to the physically handicapped and are scheduled to receive manual closer(s), provide adjustable unit(s) complying with ANSI A 117.1 provisions for door opening force and delayed action.

3. Furnish and mount electro-magnetic door holder(s) where shown on the Contract Drawings. Electrical connections for such item(s), if any, are specified in Division 16 Section(s) of these Specifications.

4. Provide integral smoke detector device in combination door closers and holders complying with UL 228.

C. Exit Devices:

1. Conform to requirements of ANSI A 156.3 Grade 1. Where emergency exit devices are required on fire rated door(s), provide exit devices available as a complete series, listed in UL "Accident Equipment List - Panic Hardware" and bearing the designation "Fire Exit Hardware".

D. Locks:

1. Conform to the following ANSI Standards, provide 5/8 inch minimum throw on pairs of non-fire-rated doors and 3/4 inch minimum throw on pairs of fire-rated doors:

(a.) Mortise Locks and Latches: A 15, Grade 1.

(b.) Cylindrical Locks and Latches: A 156.2, Grade 1.

E. Cylinders:

1. Conform to the requirements of ANSI A 156.5 Grade 1, UL listed, and tested for drill and pick resistance requirements of UL 437.

F. Strikes:

1. Manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set. Provide dust-proof strikes for foot-bolts, except where threshold provides non-recessed strike for bolt.

G. Template Hinges:

1. Conform to ANSI A 156.1 and A 156.7. All hinges shall be full-mortise type, ball-bearing function, unless otherwise indicated on Hardware Schedule Appendix "B".

H. Materials and Finish;

1. Conform to ANSI A 156.18, do not furnish products of Type 0 "optional" materials or forming methods. Provide matching finishes for hardware units at each door or opening to the greatest extent possible. Reduce color and texture differences as much as commercially possible.

1.5 QUALITY ASSURANCE

A. The entity performing Work of this Section shall have a minimum of 5 years of experience involving quantities and complexities at least equal to those required for the Work of this Section, and shall employ an architectural hardware consultant who shall be available for consultation at the construction site if requested by the Engineer.

B. Manufacturers for various products are listed in Finish Hardware Schedule Appendix "B". Except as otherwise shown on Appendix "B", products of equivalent quality, design and function by other manufacturers may be used subject to approval of the Engineer in accordance with 1.06 A hereof.

1. Provide each type of hardware (latch and locksets, mortise locks, mortise cylinders, hinges, closers, or other items) from a single manufacturer.

2. Where finish hardware provided as Work of this Section is to be installed within an existing Authority facility, provide such items from the same manufacturer as presently installed, unless otherwise shown on Appendix "B".

1.6 DELIVERY, STORAGE, AND HANDLING

A. Tag or package each item separately, with identification related hardware schedule required in 1.06 B.1 set number. Include manufacturer's basic installation instructions with each item or package.

B. Pack and deliver all locks and cylinders less keys.

C. Provide secure lock-up for hardware delivered to the construction site, but not yet installed. Provide controlled handling and installation of hardware until issuance of the Certificate of Final Completion.

1.6 SUBMITTALS

A. Product Data

B. Submit a finish hardware data sheet listing manufacturers of finish hardware to be furnished and installed as Work of this Section.

C. Samples

D. Submit one sample of each type of hardware unit, tagged with full description. Samples shall be retained by and become the property of the Client.

E. Schedules

1. Hardware Schedule: Based on the manufacturers approved in accordance with 1.06 A. Organize schedule by hardware sets and include the following:

   a. Name and manufacturer of each item.

   b. Type, style function, size and finish of each item.

   c. Location of hardware set cross referenced to Contract Drawing door opening numbers.

   d. Door and frame sizes, and materials.

   e. Wiring diagrams of electronic hardware items.

   f. Explanation of all abbreviations, codes and symbols contained in schedule.

   g. UL label designation.

F. Quality Assurance

1. Submit templates to each fabricator of doors and frames as required for preparation to receive hardware. Submit to the Architect notification of such transmittals to door fabricator(s).

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in the Door Hardware Schedule on the Drawings to comply with requirements in this Section.

B. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products and products equivalent in function and comparable in quality to named products.

Item	Manufacturer
Hinges	Baldwin, McKinney Stanley
Locks/Latches	Best, Corbin, Yale
Cylinders	Best, Corbin, Yale
Exit/Panic Devices	Corbin, Yale, Von Duprin
Door Bolts	Builders Brass Works, Ives, Stanley
Overhead Closers	Yale
Smoke-activated Closures	Corbin, Dorma
Floor Closers	Door O Matic, Dorma, Rixon Firemark

Overhead Stop	Corbin, Glynn-Johnson, Rixon Firemark
Door Stripping, Drop Seal & Threshold	A.J. May, Pemko, Zero
Silencers	Builders Brass Works, Ives, Quality
Push/Pull Units and Protection Plates	Builders Brass Works, Tremco, Quality Hardware Co.
Door Trim/Stops	Builders Brass Works, Glynn-Johnson, Ives

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced ball bearing hinges for hinges in bronze finish

2.3 MECHANICAL LOCKS AND LATCHES

A. Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

Bored Locks: Minimum 1/2-inch latchbolt throw.
Mortise Locks: Minimum 3/4-inch latchbolt throw.
Deadbolts: Minimum 1.25-inch bolt throw.

B. Lock Backset: 2-3/4 inches, unless otherwise indicated.

Knobs: Cast.
Escutcheons (Roses): Cast.
Dummy Trim: Match lock trim and escutcheons.
Operating Device: Knob with escutcheons (roses).

C. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

D. Bored Locks: BHMA A156.2; Grade **2**; Series 4000.

E. Mortise Locks: BHMA A156.13; Operational Grade 2; stamped steel case with steel or brass parts; Series 1000.

2.4 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze.

B. Manufacturer: Same manufacturer as for locking devices.

2.5 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, and as directed by the Owner.

B. Retain one of first four subparagraphs below.

C. Keys: Nickel silver or brass.

D. Retain first subparagraph below if key requires special marking.

E. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

Notation: "DO NOT DUPLICATE." Or other information to be furnished by Owner.

2.6 OPERATING TRIM

A. Operating Trim: BHMA A156.6; brass unless otherwise indicated.

2.7 SURFACE DOOR CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

Yale 1900 Series Traditional Surface Door Closer, Parallel Arm, Dull Bronze Finish, Model PA19-0-2/4DL-6912.8

2.8 CONCEALED CLOSERS

A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.9 CLOSER HOLDER RELEASE DEVICES

B. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system.

2.10 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; cast brass or bronze as directed.

2.11 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

2.12 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.13 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

B. Manufacturer's identification is permitted on rim of lock cylinders only.

C. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

D. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

E. Retain first subparagraph below where visual quality is important. Coordinate with Section 081416 "Flush Wood Doors."

F. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

G. NFPA 80 requires locks, latches, surface-mounted top and bottom bolts, and fire-exit hardware to be secured with machine screws or through bolts.

2.14 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

F. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.

G. Lock Cylinders: Install construction cores to secure building and areas during construction period.

H. Retain one of two subparagraphs below.

I. Replace construction cores with permanent cores as directed by Owner.

J. Furnish permanent cores to Owner for installation.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. If thresholds on doors other than exterior doors are set in full bed of sealant, indicate locations in door hardware schedule or on Drawings, or revise first paragraph below.

M. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07920 "Joint Sealants."

N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

Q. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

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

B. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

C. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

D. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

E. Requirements in paragraph below might be difficult to monitor and will increase cost; however, owners of substantial projects might determine the cost is justified.

F. Occupancy Adjustment: Approximately [three] [six] <Insert number> months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Retain this article for projects with complex or atypical door hardware.

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 08710

SECTION 08711 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Providing power door operators for one out swinging door at main building entrance and two doors at the entrance vestibule.

B. Related Requirements:

1. Section 06200 – Architectural Woodwork.

2. Section 08411 – Aluminum Framed Entrances.

1.3 DEFINITIONS

A. AAADM: American Association of Automatic Door Manufacturers.

B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.

C. Double-Egress (Doors): A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion between them.

D. Double-Swing (Doors): A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.

E. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.

1.4 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

1.5 COORDINATION

A. Coordinate sizes and locations of recesses in concrete floors for recessed control mats that control automatic door operators. Concrete, reinforcement, and formwork requirements are specified elsewhere.

B. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing automatic door operators.

C. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.

D. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies.

1.6 PRE-INSTALLATION MEETING

A. Pre-installation Conference: Conduct conference at Project site.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For automatic door operators.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate locations of activation and safety devices.
4. Include diagrams for power, signal, and control wiring.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of automatic door operator

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's special warranties.

1.9 CLOSEOUT SUBMITTALS

A. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.

1.10 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Faulty or sporadic operation of automatic door operator, including controls.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sargent Manufacturing Company, MPower 4000 Automatically open operator, as manufactured by ASSA Abloy, New Haven, CT 800 727-5477

B. Stanley Access Technology, Magic-Access™ Series automatic door operator; as manufactured Stanley, Farmington, CT 800 722-2377

C. Source Limitations: Obtain automatic door operators, including activation and safety devices, from single source from single manufacturer.

2.2 AUTOMATIC DOOR OPERATORS, GENERAL

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

2. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in fully closed position when subjected to wind load of 75 mph.

B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.

C. Hinges: See Section 08710 - Door Hardware for hinge type for each door that door operator shall accommodate.

D. Housing for Overhead Concealed Operators: Fabricated from minimum 0.125-inch thick, extruded or formed aluminum and extending full width of door opening including door jambs to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

E. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch thick, extruded or formed aluminum; continuous over full width of operator-controlled door opening with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

F. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 POWER DOOR OPERATORS

A. Standard: BHMA A156.10 and ANSI A117.1 and A156.19.

B. Operators: Self-contained units powered by a minimum fractional horsepower, permanent-magnet DC motors.

1. Electro-mechanical Operator: Transmit power from operator to door through reduction gear train, splined spindle, door arm, and linkage assembly. Drive train shall have positive constant engagement.

2. Operation: Power opening and spring closing.

3. Capacity: Rated for door panels weighing up to 125 lb (57 kg)

4. Mounting: Visible

5. Features:
   a. Adjustable opening, open check, and closing speeds.

b. Adjustable opening force.
c. Adjustable hold-open time between 0 and 30 seconds.
d. Reverse on obstruction.
e. Push to operate activation.

C. Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be adjustable for positive closing action at a low material stress level for long spring life.

D. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.

E. Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 5 amps.

2.4 ELECTRICAL CONTROLS

A. Electrical Control System: Electrical control system shall include a solid state controller with quick connect plugs.

B. Controller Protection: The controller shall incorporate the following features to ensure trouble free operation:

1. Main Fuse Protection.
2. Electronic Surge Protection.
3. Internal Power Supply Protection.
4. Motor Protection, over-current protection.

C. Program Dip Switches: The controller shall have program dip switches to allow selection or change of activation options; standard activation or push-to-operate.

D. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

2.5 ACTIVATION DEVICES

A. Push Plates: Provide 4 ½ inch square SPDT push plates with UL listed switch. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open". Push plates shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls.

2.6 ALUMINUM FINISHES

A. Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.

B. Class I, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following:

1. Color: Dark Bronze.
2. AAMA 606.1
3. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

2.7 FABRICATION

A. Factory fabricate automatic door operators to comply with indicated standards.

B. Form aluminum shapes before finishing.

C. Fabricate exterior components to drain condensation and water passing joints within operator enclosure to the exterior.

D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

E. Provide metal cladding, completely covering visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of automatic door operators.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.

C. Verify that full-height finger guards are installed at each door with pivot hinges where door has a clearance at hinge side greater than 1/4 inch and less than 3/4 inch with door in any position.

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

3.2 INSTALLATION

A. General: Install automatic door operators according to manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.

1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.

B. Controls: Install activation and safety devices according to manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 16 Sections.

D. Retain "Access-Control System" Paragraph below if access-control system requirements are inserted in Part 2.

E. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI A156.19 by AAADM Certified Technician and as recommended by manufacturer; comply with requirements of applicable BHMA standards

3.5 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

END OF SECTION 08711

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Glazing at interior wood framed transom windows at locations of removed glazing.

B. Related Sections:

1. Section 08140 - Wood Framed Glass Doors and Transoms.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1.6 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product; 12 inches square.

C. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in 12-inch lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass, glazing sealants and glazing gaskets.

D. Warranties: Sample of special warranties.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Source Limitations for Glass: Obtain ultraclear float glass, laminated glass and insulating glass from single source from single manufacturer for each glass type.

E. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.

Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

G. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

H. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

J. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

K. Preinstallation Conference: Conduct conference at Project site

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F

1.11 WARRANTY

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. AFG Industries, Inc.; Krystal Klear.
   b. Guardian Industries Corp.; Ultrawhite.
   c. Pilkington North America; Optiwhite.
   d. PPG Industries, Inc.; Starphire.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. Sika Corporation, Construction Products Division; SikaSil-C990.
d. Tremco Incorporated; Spectrem 1.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. 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.

C. 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.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. 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.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

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.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 09290 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
3. Section 093000 "Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. Lafarge North America Inc.
5. National Gypsum Company.
6. PABCO Gypsum.
7. Temple-Inland.

8. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch
2. Long Edges: Tapered

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch
2. Long Edges: Tapered

D. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

1. Thickness: 1/4 inch
2. Long Edges: Tapered.

E. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch
2. Long Edges: Tapered.

F. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1

1. Core: 5/8 inch Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

G. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 1/2 inch regular type
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum; Firebloc Type C.
b. CertainTeed Corp.; ProRoc Type C.
c. Georgia-Pacific Gypsum LLC; Fireguard C.
d. Lafarge North America Inc.; Firecheck Type C.
e. National Gypsum Company; Gold Bond Fire-Shield C.
f. PABCO Gypsum; Flame Curb Type Super C.

g. Temple-Inland; Type TG-C.
h. USG Corporation; Firecode C Core.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

2.5 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; GlasRoc Tile Backer.
b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.

2. Core: As indicated on Drawings
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. C-Cure; C-Cure Board 990.
b. CertainTeed Corp.; FiberCement BackerBoard.
c. Custom Building Products; Wonderboard
d. FinPan, Inc.; Util-A-Crete Concrete Backer Board / EZ Backer /ProTEC.
e. James Hardie Building Products, Inc.; Hardiebacker 500.
f. National Gypsum Company, Permabase Cement Board.
g. USG Corporation; DUROCK Cement Board.

2. Thickness: 1/2 inch
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum.
b. CertainTeed Corp.
c. Georgia-Pacific Gypsum LLC.
d. Lafarge North America Inc.
e. PABCO Gypsum.
f. Temple-Inland.

g. USG Corporation.

2. Core: Type C as required by fire-resistance-rated assembly indicated on Drawings.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Laminating adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. Grabber Construction Products; Acoustical Sealant GSC.
c. Pecora Corporation;
d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

2.9 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Georgia-Pacific Gypsum LLC; ToughRock Ceiling Textures/Polystyrene.
b. National Gypsum Company; ProForm Perfect Spray.
c. USG Corporation; SHEETROCK Ceiling Spray Texture, QT.

2. Texture: Fine

C. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; ProRoc Wall and Ceiling Spray Texture.
b. Georgia-Pacific Gypsum LLC; ToughRock Ceiling Textures/Vermiculite.
c. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).

2. Texture: Light spatter

D. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
b. National Gypsum Company; Perfect Spray EM Texture.
c. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

2. Texture: Spatter

E. Acoustical Finish: Water-based, chemical-setting or drying-type, job-mixed texture finish for spray application.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. International Cellulose Corp.; SonaSpray "fc."
b. USG Corporation; USG Acoustical Plaster Finish.

2. Application Thickness: 1/2 inch
3. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 50 or less.

4. NRC: 0.55 according to ASTM C 423.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: 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 for locating edge trim and

closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

C. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners
2. Bullnose Bead: Use where indicated
3. LC-Bead: Use at exposed panel edges
4. L-Bead: Use where indicated
5. U-Bead: Use where indicated
6. Curved-Edge Cornerbead: Use at curved openings.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges

E. Aluminum Trim: Install in locations indicated on Drawings

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile
3. Level 3: Where indicated on Drawings
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: Where indicated on Drawings

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09290

SECTION 09230 - GYPSUM PLASTERING

PART ONE GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Repair of existing deteriorated gypsum plasterwork at walls, ceilings and plaster ornament to match original where indicated on the drawings.

2. Scrape, prime, paint plaster all finishes. See Section 09900 – Interior Painting.

1.03 QUALITY ASSURANCE

A. Mockups: Before plastering, install mockups of at least 10 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following applications:

   a. Troweled Finishes: Surfaces indicated to receive non-textured paint finishes.
   b. Surfaces with float finishes.

2. Simulate finished lighting conditions for review of mockups.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.05 PROJECT CONDITIONS

A. Comply with ASTM C 842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain temperatures at not less than 55 deg F or greater than 80 deg F for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.

C. Avoid conditions that result in gypsum plaster drying out too quickly.

1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.

2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.

3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

PART TWO PRODUCTS

2.01 EXPANDED-METAL LATH

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers or approved equal:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.

2. Clark Western Building Systems.

3. Dietrich Metal Framing; a Worthington Industries company.

B. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet, ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coated.

1. Paper Backing: Kraft paper factory bonded to back of lath.

2. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd.

2.02 ACCESSORIES

A. General: Comply with ASTM C 841 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers or approved equal:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.

2. Clark Western Building Systems

3. Dietrich Metal Framing; a Worthington Industries company.

4. Cornerite: Fabricated from expanded-metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

5. Striplath: Fabricated from expanded-metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

6. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.

   a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.

   b. Small nose cornerbead with perforated flanges; use on curved corners.

   c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.

7. Casing Beads: Fabricated from zinc-coated galvanized steel; square-edged style; with expanded flanges.

8. Control Joints: Fabricated from zinc-coated galvanized steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.

2.03 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding Compound: ASTM C 631.

C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.

D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 841.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

2.04 BASE-COAT PLASTER MATERIALS

A. Base-Coat Plasters, General: ASTM C 28/C 28M.

B. Lightweight Gypsum Ready-Mixed Plaster: With mill-mixed perlite aggregate.

   1. Products: Subject to compliance with requirements, provide the following provide one of the following available products or approved equal:

      a. National Gypsum Company; Gold Bond Gypsolite.
      b. USG Corporation; Structo-Lite.

C. Gypsum Neat Plaster: For use with job-mixed aggregates.

1. Products: Subject to compliance with requirements, provide the following available products or approved equal:

a. National Gypsum Company; Gold Bond Two-Way Hardwall Plaster.
b. USG Corporation; Red Top Gypsum Plaster.

D. Aggregates for Base-Coat Plasters: ASTM C 35, sand and perlite.

2.05 FINISH-COAT PLASTER MATERIALS

A. Gypsum Gaging Plaster: ASTM C 28/C 28M.

1. Products: Subject to compliance with requirements, provide the following provide one of the following available products or approved equal:

a. National Gypsum Company; Gauging Plaster (Super-White).
b. USG Corporation; Champion Gauging Plaster.

B. Gypsum Ready-Mixed Finish Plaster: Manufacturer's standard, mill-mixed, gaged, interior finish.

1. Products: Subject to compliance with requirements, provide the following provide one of the following available products or approved equal:

a. National Gypsum Company; Gold Bond Kal-Kote Smooth.
b. USG Corporation; Diamond Brand Interior Finish Plaster.

C. Gypsum Keene's Cement: ASTM C 61/C 61M.

1. Products: Subject to compliance with requirements, provide one of the following available products or approved equal:

a. USG Corporation; Red Top Keene's Cement.

D. Lime: ASTM C 206, Type S, special finishing hydrated lime.

1. Products: Subject to compliance with requirements, provide one of the following available products or approved equal:

a. USG Corporation; Ivory Finish Lime.

E. Lime: ASTM C 206, Type N, normal finishing hydrated lime.

1. Products: Subject to compliance with requirements, provide the following available products or approved equal:

a. USG Corporation; Grand Prize Finish Lime.

F. Aggregates for Float Finishes: ASTM C 35, sand; graded per ASTM C 842.

2.06 PLASTER MIXES

A. Mixing: Comply with ASTM C 842 and manufacturer's written instructions for applications indicated.

PART THREE EXECUTION

3.01 EXAMINATION

A. Examine nonstructural and structural metal and wood framing and substrates for compliance with requirements and other conditions affecting performance of the Work.

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

3.02 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.03 INSTALLATION, GENERAL

A. Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

1. Seal construction at perimeters, behind control and expansion 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.

3.04 INSTALLING EXPANDED-METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 841.

1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.

2. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh lath.

3. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.05 INSTALLING ACCESSORIES

A. General: Install according to ASTM C 841.

B. Cornerbeads: Install at external corners.

C. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.

3.06 PLASTER APPLICATION

A. General: Comply with ASTM C 842.

1. 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 on surface.

2. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor.

3. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

4. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on unit masonry and plaster bases.

C. Base Coats:

1. Base Coats over Expanded-Metal Lath: Gypsum neat plaster with job-mixed sand for scratch and brown coats.

2. Base Coats over Expanded-Metal Lath:

a. Scratch Coat: Gypsum wood-fibered plaster; neat or with job-mixed sand.
b. Brown Coat: Gypsum neat plaster with job-mixed sand.

3. Base Coats over Unit Masonry: Gypsum neat plaster with job-mixed sand.

D. Finish Coats:

1. Finish-Coat Mix for Smooth-Troweled Finishes: Gypsum gaging plaster or Gypsum ready-mixed finish plaster.

2. Finish-Coat Mix for Float Finishes: Gypsum gaging plaster.

E. Plaster Finishes:

1. Provide troweled finish unless otherwise indicated.

2. Provide float finish where indicated

F. Concealed Plaster:

1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.

2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.

3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, finish coat may be omitted.

3.07 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.08 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09230

SECTION 09240 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Gypsum board shaft wall assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For shaft wall assemblies, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

C. Low-Emitting Materials: Gypsum shaft wall assemblies shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated

B. STC Rating: 51, minimum

C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.

1. Depth: As indicated
2. Minimum Base-Metal Thickness: 0.033 inch

D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.

1. Minimum Base-Metal Thickness: Matching steel studs

E. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.

F. Elevator Hoistway Entrances: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches matching studs in depth, and not less than 0.033 inch thick.

G. Room-Side Finish: Gypsum board or Cementitious backer units

H. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation

I. Insulation: Sound attenuation blankets.

2.3 PANEL PRODUCTS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. American Gypsum; Shaft Liner.
   b. CertainTeed Corp.; ProRoc Shaftliner.
   c. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; ToughRock Fireguard Shaftliner.
   d. Lafarge North America, Inc.; Firecheck Type X Shaftliner.
   e. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner.
   f. PABCO Gypsum; Pabcore Shaftliner Type X.
   g. Temple-Inland Inc.; Fire-Rated SilentGuard Gypsum Shaftliner System.
   h. USG Corporation; Sheetrock Brand Gypsum Liner Panel.

2. Thickness: 1 inch
3. Long Edges: Double bevel.

C. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. CertainTeed Corp.; ProRoc Moisture and Mold Resistant Shaftliner.
   b. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Dens-Glass Ultra Shaftliner.
   c. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
   d. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
   e. PABCO Gypsum; Pabcore Mold Curb Shaftliner Type X.
   f. Temple-Inland Inc.; Fire-Rated SilentGuard TS Mold-Resistant Gypsum Shaftliner System.
   g. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.

2. Thickness: 1 inch
3. Long Edges: Double bevel.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. Gypsum Board: As specified in Section 092900 "Gypsum Board."

E. Gypsum Base for Gypsum Veneer Plaster: As specified in Section 092613 "Gypsum Veneer Plastering."

F. Cementitious Backer Units: As specified in Section 093000 "Tiling."

2.4 NON-LOAD-BEARING STEEL FRAMING

A. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25percent.

B. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 unless otherwise indicated.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Fire Trak Corp.; Fire Trak System[attached to studs with Fire Trak Posi Klip].
b. Grace Construction Products; FlameSafe FlowTrak System.
c. Metal-Lite, Inc.; The System.
d. Steel Network Inc. VertiClip SLDSeries.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board"that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.

E. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."

F. Acoustical Sealant: As specified in Section 092900 "Gypsum Board."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fireproofing."

B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.

2. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Cant Panels: At projections into shaft exceeding 4 inches, install 1/2- or 5/8-inch- thick gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft wall framing.
2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft wall framing.

J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09240

SECTION 09240 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For firestop tracks, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 , hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

1. Steel Studs and Runners:

   a. Minimum Base-Metal Thickness: 0.027 inch
   b. Depth: As indicated on Drawings

2. Dimpled Steel Studs and Runners:

   a. Minimum Base-Metal Thickness: As indicated on Drawings
   b. Depth: As indicated on Drawings

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

   a. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
      2) MBA Building Supplies; FlatSteel Deflection Track
      3) Steel Network Inc. (The); VertiClip SLD Series.
      4) Superior Metal Trim; Superior Flex Track System (SFT).
      5) Telling Industries; Vertical Slip Track II.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
    b. Grace Construction Products; FlameSafe FlowTrak System.
    c. Metal-Lite, Inc.; The System.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

    1. Minimum Base-Metal Thickness: 0.027 inch

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.

    1. Depth: 1-1/2 inches
    2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

    1. Minimum Base-Metal Thickness: 0.018 inch
    2. Depth: 7/8 inch

H. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

    1. Configuration: Asymmetrical or hat shaped.

I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

    1. Depth: 3/4 inch
    2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch
    3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

    1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5

times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Postinstalled, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.25 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, in size indicated on Drawings

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2-1/2 inches

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.027 inch
b. Depth: As indicated on Drawings

3. Dimpled Steel Studs and Runners: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.025 inch
b. Depth: As indicated on Drawings

4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base-Metal Thickness: 0.033 inch

5. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical or hat shaped.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.

b. Chicago Metallic Corporation; Drywall Grid System.
c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

A. Intumescent Reveal Angle: provide at walls requiring fire rating

1. CEEMCO DDA-1: 5/8" x 1-1/4" Angle with intumescent tape.

B. Reveal Reglet: Provide at Floor Base reveals, Wall to Ceiling Reveals and Dropped Ceiling Line on wall Reveal

1. Provide "F" Reveal by Fry Reglet

C. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

D. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are

indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of

furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet >measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09240

SECTION 09400 – MARBLE/CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this section consists of providing all labor, materials, equipment and services to complete the restoration of the existing marble mosaic tile flooring at the first, second and third floor levels to match the original tile and the installation of new marble and ceramic tile flooring and wall covering where specified at the interior of the New London City Hall.

1. Work will be performed includes but is not limited to:

   a. Remove improper patches and properly patch all damaged areas and cracks in marble mosaic flooring at the 1st – 3rd floor lobby area where indicated on the drawings.
   b. Install new marble mosaic flooring at location of removed existing elevator at the first floor to match original.
   c. Replacing damaged or missing grout to match original in original marble mosaic flooring.
   d. Clean all existing marble mosaic floors and marble baseboards with appropriate procedure and cleaner.
   e. At elevator lobbies install new white square porcelain mosaic flooring and new green thresholds where indicated on the drawings.
   f. At City Clerks vault clean/repair/replace existing white ceramic hex tile as necessary and install new white ceramic hex tile to match original where indicated on the drawings.
   g. Install new white ceramic hex tile flooring in toilet rooms where shown on the drawings.
   h. Install new quarry tile flooring in electrical/IT/utility closets.
   i. Install new white ceramic subway tiles with chair rail cap in toilet room walls.

2. Contractor shall inspect the existing tile flooring to determine any additional defects prior to the installation of this contract. Any such defects shall be reported to the Architect prior to beginning the work of this section.

B. Related Sections:

1. Section 04500 – Masonry Restoration
2. Section 06100 – Wood Floor Restoration
3. Section 06200 – Architectural Woodwork Restoration

1.2 REFERENCES

A. American National Standards Institute (ANSI – Current Edition).

B. Tile Council of America (TCA – Current Edition).

C. American Society for Testing and Materials (ASTM – Current Edition).

D. Secretary of the Interior's Standards. All work shall comply with the United States Secretary of the Interior Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, unless indicated otherwise.

1.3 SUBMITTALS

A. Contractor qualification data: Submit qualification data and references for firms and persons specified in Section 1.4 "Quality Assurance" to demonstrate their capabilities and experience. Bidders shall visit the site and make themselves familiar with the site conditions.

B. Contractor shall submit conditions assessment and conservation program including detailed description of how the work of this Section will be accomplished. This should include products to be used, methods for any necessary removal, grouting, etc.

C. Provide written descriptions, drawings and diagrams outlining proposed methods and procedures for protection of personnel, the public, and the existing construction during the work of this Section.

D. Contractor shall submit copies of the manufacturers' technical data for handling, storage and application of each product used in tile installation, including the manufacturers' recommendations for application and use. Include test reports and certificates that verify the product's compliance with the specification's requirements. Submit manufacturers' certification that the materials supplied conform to ANSI 137.1.

E. Submit 2 samples of each of the following:

1. Tile in each type, range of color, and size required for replication and new installation.

2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.

3. Stone thresholds in 6-inch lengths.

4. Individual samples of all grouting material, including samples of colored grout as necessary.

F. Submit proof of warranty of materials.

1.4 QUALITY ASSURANCE

A. Contractor must have a minimum of five (5) years of experience and must demonstrate three projects similar in scope and type to the required work involving tile flooring.

B. Contractor shall maintain a steady work crew of mechanics highly skilled in the art and necessary craft of tile installation and removal, and are familiar with the design requirements.

C. Architect shall be given regular access to the Contractor's scaffolding/work site so that he/she me inspect work being performed.

D. Contractor shall replace at no additional expense to the Owner all lost, broken, and damaged historic materials resulting from repair, removal, installation, transportation, cleaning or storing.

E. Work is to be performed on a daily basis without interruption unless directed otherwise by the Architect.

F. In acceptance or rejection of the work of this Section, no allowances shall be made for lack of skill on the part of the mechanics.

G. All repair work shall match the original in all respects, including color, design, texture, finish, dimensions.

H. Materials shall be used only at the manufacturer's recommended temperature tolerances. The substrate temperature and ambient temperature at the locations where the tile is to be installed shall be maintained above 50 degrees Fahrenheit during the work and maintained at or above 50 degrees Fahrenheit for seven (7) days after the completion of the work. If site conditions make it impractical to maintain a temperature above 50 degrees Fahrenheit, the Contractor shall schedule tile work so that seasonal temperatures will cause the substrate temperature and the ambient temperature in the station to be maintained as specified above. The area in which the materials are stored shall be maintained at a temperature above 32 degrees Fahrenheit.

1.5 MOCK-UPS

A. Upon completion of conditions assessment and conservation program reports, but prior to executing work, provide in-place mockup panels for the Architect's approval. Resubmit panels until the Architect is fully satisfied. Mockups shall be approved for color, texture, and surface appearance.

B. The following mock-ups shall be executed.

1. Removal of damaged tile.
2. Installation of all new tiles for each type with matching grout color.
3. Cleaning of tiles.

C. Contractor shall protect approved mockup panels for the duration of the work. The mockups shall be set as the standard of work in this Section and for the approval of subsequent work. Approved mockups may be integrated into the final work.

1.6 COORDINATION

A. At least three weeks prior to commencing the work of this Section, a meeting must be scheduled at the jobsite to discuss conformance with the requirements of specifications and job site conditions. Representatives of the Contractor, Architect and other parties involved in the scope of this work shall attend the meeting.

B. Contractor shall coordinate his or her work with that of other trades related to the successful completion of the work of this Section. Contractor shall not proceed with aspects of this work that require completion of other trades until all such work of other trades is completed.

C. Field Supervised Construction: Contractor shall notify Architect before beginning tile restoration. Obtain the Architect's approval for the removal and installation of tile before proceeding with the remainder of the work.

1.7 PROTECTION

A. Protect all adjacent areas from damage during the work of this Section using approved means of physical protection.

B. Protect all adjacent surfaces and projections from all dropping grout and setting materials. Use canvas or polyethylene covers, if necessary, and remove all unwanted material that comes in contact with any historic material immediately so as not to cause staining.

1.8 DELIVERY, STORAGE AND HANDLING

A. All packaged material shall be delivered to the job site in original, unbroken containers. The containers shall be branded with the shipping mark and other designations corresponding with the information given on the master grade certification.

B. All materials for use in the work of this Section shall be stored under environmental conditions recommended by the manufacturer. Materials should be kept dry (includes protection from liquid moisture and water vapor), well-ventilated and free of foreign matter. Protect materials from tampering, acts of vandalism, possible injury to workers and the public in general. Every precaution shall be taken not to stain the tiles before they are set in place. No discolored, warped, stained, chipped or spalled tile shall be installed during this work.

C. Arrangement shall be made with the Architect to store equipment and materials in designated areas. The Architect shall not be responsible for damaged or stolen materials or equipment left on the premises by the Contractor.

D. All vessels shall have tight fitting covers. At no time shall vessels containing chemicals be carried to working levels when vessels are open.

1.9 EXTRA MATERIAL STOCK

A. Upon the completion of the work in this Section, deliver to the Owner additional new tile as used in the work for the Owner's use for replacement and maintenance. Figure 5% each type of tile supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

2. Acceptable Manufacturer: Daltile Corporation: 7834 C.F. Hawn Fwy. P. O. Box 170130; Dallas, TX 75217; Toll Free Tel: 800-933-TILE; Web:www.daltile.com; Local Representative: Dal-Tile and Stone, North Haven, CT, Lucia Franco, 203 230-8315. Substitutions: As approved by the Architect.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

2.2 TILES

A. New square marble mosaic tiles at existing building lobbies:
1. In size, shape, color, texture, and pattern to match the existing mosaic flooring tiles.

B. New hexagonal ceramic tile at Bathroom Floors and vault area:
1. Style: Daltile Keystones Colorbody Porcelain
2. Face Size: 1 by 1 inch hexagonal mosaic tile.
3. Thickness: 1/2 inch.
4. Wearing Surface: Nonabrasive, smooth.
5. Finish: Mat, unglazed.
6. Tile Color: White K101.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable.

C. New square ceramic tile at elevator lobbies:
1. Style: Daltile Keystones Colorbody Porcelain
2. Face Size: 1 by 1 inch square mosaic tile.
3. Thickness: 1/2 inch.
4. Wearing Surface: Nonabrasive, smooth.
5. Finish: Mat, unglazed.

6. Color: Artic White D617.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable.
9. Threshold: Daltile Accent Tile: D452 Cypress
10. Baseboard: Daltile Keystones Colorbody Porcelain Cove Base C-833; Color as selected by Architect from manufacturer's full range.

D. New ceramic subway tiles with chair rail cap in toilet room walls.
1. Style: Daltile Rittenhouse
2. Face Size: 3 by 6 inches.
3. Thickness: 5/16 inch.
4. Wearing Surface: Nonabrasive, smooth.
5. Finish: Opaque glaze.
6. Tile Color: White K101.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable.
9. Base: Daltile Colorbody Porcelain Coved C-833, size 3 by 6 inches.
10. Cap: Daltile White Shelf Rail K101.

E. New Ceramic square-edged Quarry Tile: tile flooring in electrical/IT/utility closets:
1. Face Size: 6 by 6 inches.
2. Thickness: 1/2 inch.
3. Wearing Surface: Nonabrasive, smooth.
4. Finish: Mat, opaque glaze.
5. Tile Color: Ashen Gray 0T03.
6. Grout Color: As selected by Architect from manufacturer's full range.
7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable.
8. Base: Coved with surface bullnose top edge, face size 6 by 6 inches.

F. Replacement or New baseboard:
1. In Lobbies and Side Halls - Replacement White Vermont Marble In size, shape, color, texture, and pattern to match the existing marble baseboards.
2. At locations of original ceramic hex tile flooring - Replacement Green Vermont Marble, Verde Antique In size, shape, color, texture, and pattern to match the existing marble baseboards.
3. At New Elevator Lobbies – New Green Vermont Slate in size and shape to match the existing marble baseboards elsewhere in building.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

B. If difference in floor levels exceeds 1/2 inch (12.7 mm), a ramp must be used; show ramps on Drawings.

C. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

D. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.

2.4.1 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Dry-Set Portland Cement Mortar (Thinset): ANSI A118.1.

C. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

D. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

2.5 GROUT MATERIALS

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Grouting material shall match the historic grout in composition and color.

C. Add materials, water, and additives in accurate proportions.

D. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

E. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

F. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.6 CLEANERS

A. Cleaning tests will be performed to determine the most gentle and most effective method for cleaning tiles.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers. Products to be tested include:

1. 2% v/v dilution of Orvus WA Paste (2ml Orvus in 100LM water) as manufactured by Proctor and Gamble.

2. 1:6 dilution of Vulpex soap as manufactured by Picreator Enterprises Ldt.

3. 1:4 dilution of Simple Green as manufactured by Sunshine Makers, Inc.

4. Or approved equal.

2.7 ADHESIVE

A. Adhesive to be a conservation grade, clear drying adhesive such as Jade No. 711, or approved equal.

2.8 WATER

A. Water shall be potable and free from all substances that would be deleterious to tiles, grout, or setting materials.

2.9 TOOLS

A. Contractor to supply all tools for the completion of the work of this section.

B. No power tools are to be used.

C. Brushes for cleaning tile shall be stiff natural bristle brushes.

2.10 PROTECTION MATERIALS

A. Polyethylene foam that does not off-gas such as Ethafoam, or approved equal.

B. 100% unbleached cotton batting.

C. Polyethylene sheeting, 6-8mil, or approved equal.

PART 3 - EXECUTION

3.1 TEMPORARY PROTECTION

A. Cover adjacent surfaces and adjacent decorative features with protective sheeting to prevent damage or staining from restoration materials.

3.2 INSPECTION

A. The Contractor, Contractor or both shall examine substrate and conditions under which this work is to be performed and notify the Architect in writing of conditions detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions are corrected. Commencement of work indicates that Contractor accepts substrate and conditions.

B. Contractor shall inspect all tile surfaces to determine any defects prior to the work of this contract. Any such defects shall be reported to the Architect prior to beginning the work of this Section.

C. The Contractor and Architect shall review all of the areas within the scope of work to confirm quantities, colors, and locations of tile repairs.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
3. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
4. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
5. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
6. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.3 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.4 TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-

in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in pattern indicated on the drawings unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

G. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

H. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.

I. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

J. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
   1. Ceramic Mosaic Tile: 1/16 inch.
   2. Quarry Tile: 1/4 inch.
   3. Pressed Floor Tile: 1/4 inch.
   4. Glazed Wall Tile: 1/16 inch.

K. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

L. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

   1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).

M. Grout Sealer: Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.5 CLEANING TILES

A. Clean tiles using means and methods determined during mock-up.

B. Apply cleaning products using a soft bristled brush.

C. Rinse tiles using a sponge dampened in distilled water.

D. Allow to thoroughly dry before performing additional restoration treatments.

3.6 DAMAGED TILE REMOVAL

A. Gently remove any damaged tile using hand tools. Ensure that adjacent tiles are not damaged during removal process.

3.7 RESETTING REPLACEMENT TILES

A. Reset replacement tiles in appropriate color onto setting bed and material as determined during mock-up.

B. Final level of replacement tiles to match that of the surrounding units.

3.8 GROUT FINISHING

A. Grout around all replacement tiles and in areas where the grout is damaged or missing.

B. Once grout has set, use micro-spatulas to gently remove excess plaster from the tiles surface.

3.9 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.

2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.10 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.11 CLEAN UP

A. Work areas should be left in clean condition upon the completion of this work.

B. Remove protective materials from adjacent surfaces.

C. Maintain work areas in a clean and neat condition during the execution of the work.

END OF SECTION 09400

SECTION 09843 - ACOUSTICAL CEILING CLOUDS AND GRIDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:
   1. Cloud Suspension Systems where indicated on the drawings
   2. Open Cell Ceiling Grid System at the elevator lobbies
   2. Acoustical Panels

B. Related Sections:
   1. Section 09290 – Plaster and Gypsum Board
   2. Division 15 Sections - HVAC
   3. Division 16 Sections - Electrical

C. Alternates

   1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.

   2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

   1. *ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon,* Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

3. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

7. ASTM E 1264 Classification for Acoustical Ceiling Products.

8. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

9. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

A. National Fire Protection Agency (NFPA):

1. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of cloud system required.

B. Installation Instructions: Submit manufacturer's installation instructions.

C. Shop Drawings: Layout and details of clouds. Show locations of items which are to be coordinated with clouds.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide cloud suspension system and panels by a single manufacturer.

B. Fire Performance Characteristics: The fire performance of Infusions Lay-In Panels meets the requirements for light transmitting plastics in Chapter 26 of the International Building Code. Infusions panels have been tested according to NFPA 286 and are equivalent to Class A Interior Finish as defined in Chapter 8 of the International Building Code.

C. Coordination of Work: Coordinate cloud work with installers of related work including, but not limited to suspended ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

D. Ceiling clouds, as with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern, or possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and supression systems are present.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver cloud system and panels 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 causes.

B. Before installing clouds, permit them to reach room temperature and a stabilized moisture content.

C. Handle components carefully to avoid damaging units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure:

10. Building areas to receive clouds shall be free of construction dust and debris. Products can be installed up to 100°F (38°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the canopy.

1.8 WARRANTY

A. Formations: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

1. Panels: Sagging and warping as a result of defects in materials or factory workmanship.
2. Grid System: Rust and manufacturer's defects
3. Acoustical Panels with BioBlock Plus or designated as Inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and bacterial growth.

B. Warranty Period:

1. Formations with panels designated as HumiGuard Plus: Ten (10) years from date of substantial completion.
2. Formations with metal panels, fabric panels and Infusions panels – one year (1) year from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Cloud Suspension System and Open Cell Ceiling Grid:

1. Armstrong World Industries, Inc.: Armstrong reps: Amanda Murphy 203-464-2682, Mike McDowell 717-396-6052
2. Acoustical Panels: Armstrong World Industries, Inc.

2.2 ACOUSTICAL PANEL UNITS

A. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 4x8′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Custom Built Formations as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

B. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe

5. Cloud Size: (1) 6x8′ rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0608WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required, Item #1920

C. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 6x10′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0610WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

D. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 6x10′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0610WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #8013 Ledges II, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

E. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (5) 6x12′ Rectangles
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0612WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

F. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (2) 8x8′ Squares
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0808WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

G. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (2) 8x10′ Rectangles
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0810WH as manufactured by Armstrong World Industries

8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

H. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 8x10' Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16" Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0810WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #8013 Ledges II, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

I. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 8x12' Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16" Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0812WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

J. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 8x14' Rectangle

6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16" Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA0814WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

K. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 10x10′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16" Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA1010WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

L. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 10x12′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16" Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA1012WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

M. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber

3. Surface finish: Factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (3) 10x12′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA1012WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #8013 Ledges II, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

N. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (2) 12x12′ Square
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA1212WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

O. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Acoustically transparent membrane with factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (2) 12x14′ Rectangles
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA1214WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #2822 Calla, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

P. Formations Acoustical Cloud Panel Options:

1. Surface Texture: Smooth
2. Composition: Mineral fiber
3. Surface finish: Factory-applied latex paint
4. Color: Adobe
5. Cloud Size: (1) 12x14′ Rectangle
6. Edge Detail: Sqaure Tegular for interface with Prelude 15/16″ Exposed Tee Grid System
7. Acceptable Product: Formations Panel Kit # CKETA1214WH as manufactured by Armstrong World Industries
8. Acceptable Product: Formations Panel Item #8013 Ledges II, as manufactured by Armstrong World Industries
9. Application Consideration: Extra panels may be required

2.3 CLOUD SUSPENSION SYSTEM

A. Formations Curves Acoustical Cloud Suspension Kit: (see item specified in panel details)

1. All main beams and cross tees shall be commercial quality hot-dipped galvanized steel as per ASTM A 653. Main beams and cross tees are double-web steel construction with type 15/16 inch exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
   a. Structural Classification: ASTM C 635,Heavy Duty.
   b. Main Beam: Prelude XL 15/16 HD, item #7301 as manufactured by Armstrong World Industries
   c. Cross Tee: 2 foot, item #XL8320, as manufactured by Armstrong World Industries
   d. Color: Adobe
2. Axiom Knife Edge Trim System for suspended ceiling cloud:
   a. Axiom Knife Edge: Extruded aluminum alloy trim channel
   b. Axiom Knife Edge Color: Adobe
3. Installation Hardware (included in Kit):
   a. Axiom Splices and connection clips
   b. StrongBack – Hot dipped galvanized cold rolled steel
   c. Cable Hardware – 2-1/16 inch x 1 inch x 3/8 inch quick loop wire rope clamp for 1/16 inch diameter cable

d. Cable – 7x7 aircraft cable, 1/16 inch x 120 inch galvanized with loop at one end.

2.4 OPEN CELL CEILING GRID SYSTEM

A. Metalworks Open Cell Square Lay-in Ceiling Grid System, Number 6193 :

1. Frame: Nominal 24" x 24" x 1-1/2" blade height x 9/16" blade width
2. Material: Aluminum, 0.016" thick
3. Edge Profile: 9/16″ Square Lay-In
4. Cell Grid Insert: 6″ X 6″ grid inserts
5. Finish: Powder-coated, post-production painted finish with custom color
6. Color: Adobe
7. Accessories: Metal Infill panels for sprinklers and lighting

PART 3 - EXECUTION

3.1 PREPARATION

A. Measure each ceiling area and establish layout of clouds. Comply with reflected ceiling plans. Coordinate panel layout with mechanical, electrical and sprinkler fixtures.

3.2 INSTALLATION

A. Install clouds in accordance with the manufacturer's instructions and in compliance with the authorities having jurisdiction.

3.3 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of canopies per manufacturer's instructions.

END OF SECTION 09843

SECTION 09650 - CORK FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Installation of cork tile flooring at the Council Chamber.

1.2 RELATED SECTIONS

A. Section 0940 – Marble/Ceramic Tiling.

1.3 REFERENCES

A. ASTM D 2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Submit plan and section drawings as necessary to depict applicable installation procedures and floor system configurations.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and styles.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

1.9 EXTRA MATERIALS

A. At project closeout, provide to the Owner 10 square feet of flooring for color matching and repair purposes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Globus Cork: 741 E. 136th St.; Bronx, NY 10454; Tel: 718-742-7264; Email: request info (info@corkfloor.com); Web:www.corkfloor.com

B. Substitutions: As approved by the Architect.

2.2 CORK TILE FLOORING

A. Composition: 100 percent natural cork bark and recycled cork granules and set in a natural or synthetic, flexible resin matrix; homogeneous and uniform in composition throughout the tile thickness to match the existing historic cork flooring in all aspects.

B. General:
   1. Face Dimensions: 9 inches by 9 inches
   2. Thickness: 1/2 inch.
   3. Edges: Micro bevel surface edge.
   4. Color: Random to match original existing flooring
   5. Pattern: to match original existing flooring

C. Performance:
   1. Impact Sound Reduction: 16 dB.
   2. Residual Indentation: Less than 2 percent.

3. Thermal Conductivity: 0,070 m2 K/Wure.
4. Heat Dissipation: 1 min.: 24 KJ/m2, 10min.: 117 KJ/m2.
5. Acoustical Rating: Superior.
6. Critical Radiant Flux: .61 Watts/Sq cm.
7. Optical Smoke Density - Flaming: 82.
8. Optical Smoke Density - Non-Flaming: 225.
9. Surface Flammability: Pass.
10. Static Coefficient of Friction (ADA) - Dry: 0.78.
11. Static Coefficient of Friction (ADA) - Wet: 0.92.
12. Static Load: .001 Inch (0.6 percent)
13. Thermal Conductivity (R Value): 0.45.
14. NRC- Noise Reduction Class: 0.06.
15. STC - Sound Transmission Class: 54.
16. IIC - Impact Insulation Class: 43.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Unpack cork in the room in which the product will be installed 3-4 days prior to installation to allow the natural material to acclimate.

D. Maintain a temperature between 60 and 75 F. (16 - 24 C). Relative humidity should be maintained between 40 and 60 percent for 24 hours before, during and 24 hours after the installation.

3.3 INSTALLATION - CORK TILES

A. Install in accordance with manufacturer's instructions.

B. Review and shuffle tiles before beginning the installation.

C. Adhere cork tile using a latex, water-based contact adhesive formulated especially for cork tiles. Tiles are pre-glued from the factory and the matching adhesive must be evenly applied to the subfloor during installation. Adhesive to be applied to subfloor with a roller, not a trowel. Tiles must be hit with a rubber mallet after installation to ensure positive contact.

D. Tiles have 3 factory applied coats of finish. Final finish with a water-based varnish formulated especially for cork. Apply a final commercial-grade finish coat after tile installation with a roller or paint pad.

3.4 INSTALLATION - FLOATING FLOORING

A. Install in accordance with manufacturer's instructions.

B. Review and shuffle planks before beginning the installation.

C. Begin in the corner of a room. Place the plank 1/2 inch (13mm) away from both walls at the corner.

D. Make the first long row of flooring in the room with the planks locked short end to short end, not side to side.

E. Snap subsequent planks into the end of the previous until it locks flat and tight with no gap. Do not hammer directly on the clicking ridges or the cork as they will break.

F. At row ends where cuts are required, planks may be cut using a hand saw, table saw or circular saw.

G. Tiles have 3 factory applied coats of finish. Final finish with a water-based varnish formulated especially for cork. Apply a final commercial-grade finish coat after tile installation.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09650

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General Contract Provisions and the General Requirements of Division 01 apply to the work of this Section.

1.2 WORK SUMMARY

A. This Section pertains to the provision of all field painting and finishing:

1. All interior existing/new wall and ceiling surfaces as indicated on the Drawings.

2. Decorative painting at the Council Chamber to match existing painting in all aspects.

3. Exterior/Interior metal windows, doors and frames where indicated on the Drawings.

4. Exterior metal fire escape, vents, grates and grills.

5. Painting of mechanical, electrical, plumbing equipment, piping and wiring above suspended ceiling clouds where shown on the drawings.

B. Color Schemes

1. At interior surfaces the Contractor shall match the existing color scheme or as selected by the Architect.

2. At exterior surfaces the Contractor shall match the existing color scheme.

1.3 RELATED SECTIONS

A. Section 05720 - Metalwork

B. Section 06102 - Finished Carpentry Restoration

C. Section 06200 - Finished Carpentry

D. Section 09230 - Gypsum Plastering

1.4 QUALITY ASSURANCE

A. Paint

1. The Contractor shall submit a representative samples of all surfaces to be painted with primer and 2 coats of paint to the Architect for approval.
2. Product Data:

a. Manufacturer's Information: Provide manufacturers technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

b. Certification by the manufacturer that products supplied comply with local regulations controlling the use of volatile organic compounds (VOC's)

3. The Architect shall, after consultation with the Owner, provide the Contractor with a Paint Schedule. Paint Schedule will identify all colors of all paints and finishes.

B. Reference Standards

1. Benjamin Moore and Company, Architect's Specifications.

2. Steel Structures Painting Council *"Surface Preparation Specifications"* ANSI 159.1 1972.

3. U.S. National Park Service, Preservation Brief No. 10, "Exterior Paint Problems on Historic Wood Work"

C. Inspections

1. The Contractor shall notify the Architect to inspect immediately before and after the application of paints and finishes.

D. Applicator Qualifications

1. Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

E. Maintenance Stock: At time for substantial completion, deliver stock of maintenance material to the Owner. Furnish five (5) gallons each of each color specified.

1.5 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label.

B. Provide labels on each container with the following information:

1. Name or title of material.

2. Manufacturer's stock number.

3. Manufacturer's name.

4. Contents by volume, for major pigment and vehicle constituents.

5. Thinning instructions.

6. Application instructions.

B. Storage: Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F (7 degrees C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

C. Protection: Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary precautions to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and application.

1.6 JOB CONDITIONS

A. Do not apply water-base paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 50 degrees F, unless otherwise permitted by the paint manufacturer's printed instructions.

B. Do not apply solvent-thinned paints or varnishes when the temperature of surfaces to be painted or varnished and the surrounding air temperatures are below 45 degrees F, unless otherwise permitted by the paint or varnish manufacturers' printed instructions.

C. Do not apply paint or varnish in snow, rain, fog or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless permitted by the paint and varnish manufacturers' printed instructions. Painting and varnishing may be continued during inclement weather only if the areas and surfaces to be painted or varnished are enclosed and heated within the temperature limits specified by the paint or varnish manufacturer during application and drying periods.

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide custom colors of the finished paint systems to match existing or Architect's samples as required.

2.3 PAINT MATERIALS, INTERIOR GYPSUM/PLASTER/DRYWALL

A. Gypsum/Plaster/Drywall Substrate: Provide the following paint finish systems or architect approved equal over existing/new, interior gypsum/plaster/drywall surfaces where specified. Finish color to be selected by the Architect based on field applied mock-ups:

B. Plaster Walls: Sherwin-Williams Co.
1. Primer: A24W08300 - Loxon® Concrete & Masonry Primer, Interior/Exterior Latex White
2. 2 Coats: A97W01251 - Duration Home® Interior Latex Satin Extra White

C. Plaster Ceilings
1. Primer: A24W08300 - Loxon® Concrete & Masonry Primer, Interior/Exterior Latex White
2. 2 Coats: A95W01251 - DUR HOME FL EXTRA

D. Plaster in Bathrooms: Sherwin-Williams Co.

1. Primer: A24W08300 - Loxon® Concrete & Masonry Primer, Interior/Exterior Latex White
2. 2 Coats: A98W01251 - Duration Home® Interior Latex Semi-Gloss Extra White

E. Drywall Walls: Sherwin-Williams Co.

1. Primer: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer White
2. 2 Coats: A97W01251 - Duration Home® Interior Latex Satin Extra White

F. Drywall Ceilings: Sherwin-Williams Co.

1. Primer: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer White
2. 2 Coats: A95W01251 - DUR HOME FL EXTRA

G. Drywall in Bathrooms: Sherwin-Williams Co.
1. Primer: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer White
2. 2 Coats: A98W01251 - Duration Home® Interior Latex Semi-Gloss Extra White

2.4 PAINT MATERIALS, FERROUS METALWORK

A. Ferrous Metal: Provide the following finish systems over repaired and stripped existing ferrous metalwork

B. Fire Escape, Vents, Grates and Grills, : Tnemec
   1. Metal Primer: Tnemec Series 6, Tneme-Cryl Primer
   2. Metal Finish Paint: Tnemec Series 73 Endura-Shield

C. Metal Windows, Doors and Frames: Sherwin-Williams Co.
   1. Primer: B66W00310 - Pro Industrial Pro-Cryl® Universal Acrylic Primer Off White
   2. 2 Coats: B66W01151 - Pro Industrial DTM Acrylic Semi-Gloss Extra White

2.5 PAINT MATERIALS, WOOD TRIM

A. Wood Trim: Sherwin-Williams Co.
   1. Primer: B51W00450 - Multi-Purpose Interior/Exterior Latex Primer White
   2. 2 Coats: B31W00051 - ProClassic® WaterBorne Interior Acrylic Semi-Gloss Extra White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

   1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

   1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION, GENERAL

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Special Conditions: Protect the historic paint record before removing existing paint coatings or overpainting existing surfaces.

1. It is necessary to retain intact at least one representative location of the full sequence of paint layers on representatives of each significant historic surface. Before removal of existing paint begins, the Contractor shall inspect the premises for areas of paint that are still well adhered to the substrate. Areas of between [two (2) inches square (4 si)] and [three (3) inches square (9 si)] shall be isolated and protected for the duration of the Project, and in perpetuity. All paint records shall be selected in consultation with, and to the approval of, the Architect.

2. Typical surfaces to be selected for retaining paint records include cast iron doors, frames and railings.

C. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various new coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

D. General Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

E. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

3. Use only thinners approved by paint manufacturer and only within recommended limits.

F. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.

2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.

7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.

9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. Omit primer on metal surfaces that have been shop primed and touchup painted.

3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller or other applicators according to manufacturer's written instructions, and in accordance with local work rules.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.

2. Historic Appearance:

   a. Rollers may be used for initial paint application to surfaces only if each wet coat is immediately brushed out to eliminate all evidence of roller use. Final effect should be of paint applied only by brush.
   b. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.

2. The testing agency will perform appropriate tests for the following characteristics as required by the Architect:

   a. Quantitative material analysis.
   b. Abrasion resistance.
   c. Apparent reflectivity.
   d. Flexibility.

e. Washability.
f. Absorption.
g. Accelerated weathering.
h. Dry opacity.
i. Accelerated yellowness.
j. Recoating.
k. Skinning.
l. Color retention.
m. Alkali and mildew resistance.

3. The Architect may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

B. Special Paint Removal: If the specified methods and/or materials fail to perform as intended, in general or in particular, the Contractor shall cease working on the area(s) in question, immediately notify the Architect and Owner of the problem, and request direction on how to proceed with the work. Pending receipt of written direction from the Architect, rearrange painting schedule as necessary to continue overall job progress without delay.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09900

SECTION 10290 – PEST CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. **Work**: The contractor shall provide all labor, supplies, equipment, materials, management and supervision to install barrier netting and bird deterrent systems on the exterior of building in order to prevent nesting and roosting of birds.

B. **Extent and Location**: Extent and location of Work shall be as indicated on the Drawings, and as verified with the Architect in field. Work described in this Section includes, but is not limited to, the following:

1. Installation of barrier netting system at exterior of Building where designated. The netting system shall not be noticeable from ground view.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 04500 – Masonry Restoration

1.4 QUALITY ASSURANCE

A. **Source of Materials**: Obtain materials from a single source for each type material required to ensure match of quality and compatibility of materials.

B. **Installer**: Use adequate numbers of skilled workmen, thoroughly trained and experienced, all of whom have five (5) years of experience with Work of equal scope; who are familiar with the specified requirement of restoration of historic buildings and the methods needed for proper performance of work of this Section.

C. **Warranty**: The Contractor guarantees to the Owner that said Contractor shall be responsible for any defective materials and workmanship installed by him for a period of five (5) years. The period of guarantee shall start from the date of Owner acceptance of the work. The Contractor further guarantees to make permanent repairs forthwith to restore the defective areas, and to make permanent repairs without reference to or consideration of the cause of any defects in the work.

1.5 SUBMITTALS

A. **Product Data**: Submit product data for all materials used in the work of this Section whether specified or not.

B. **Material Samples**: Submit for verification purposes, samples of all materials used in the work of this Section whether specified or not. Samples shall include, but are not limited to, the following:

1. Netting: Provide 12″ x 12″ sample of each netting specified
2. Anchors to support framework
3. Stainless-steel cable
4. Attachments for masonry
5. Attachments for wood

C. **Shop Drawings**:

1. Submit detailed shop drawings showing location, extent of installation, method(s) of anchorage, method(s) to prevent galvanic action between dissimilar metals.

2. Three (3) black and white prints or pdfs of each shop drawing shall be submitted to the Architect for approval at the earliest possible date.

3. Drawings shall be drawn to the following or a larger scale:

   a. Plans and Sections: 1/4 inch scale

   b. Details: 3 inch scale.

1.6 DELIVERY, STORAGE, AND HANDLING

A. **Delivery**: Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

B. **Storage**: Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. **Sequencing**: All façade repair work shall be completed prior to the installation of bird netting in areas scheduled for this Work.

B. **Damage**: Damage occurring to the buildings as a result of work of this Section or Contractor's failure to protect against such damage shall be the Contractor's responsibility. The Contractor shall restore damaged areas to the complete satisfaction of the Architect at no additional expense to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. **Netting**: UV resistant polyethylene, knotted multi-twine that is resistant to elemental damage, such as rot, and retains strength over time. Netting shall have a maximum of ¾" square mesh size.

1. Permanet Marble Bird Netting System as manufactured by BirdMaster, 13 Linnell Circle, Billerica, MA; 01821 PH (800) 562-2473.

2. Approved equals.

B. **Fasteners**:

1. Masonry Surfaces: All fittings, fasteners and hardware installed within masonry and wood surfaces shall be stainless steel.

2. Metal Surfaces: All fitting fasteners and hardware installed adjacent to metal surfaces shall be galvanic compatible or isolated to prevent galvanic action.

PART 3 – EXECUTION

3.1 GENERAL

A. **Field Measurements**: Contractor must verify dimensions of each installation surface.

B. All surfaces must be clean, dry and free of obstructions before installation.

C. Isolate dissimilar metals from galvanic action.

D. All netting shall not be visible from the ground.

E. **If Bird Waste is Present**: Treat, neutralize and safely remove all bird waste from installation surfaces. Installer must follow all local, state and federal regulations regarding the proper removal and disposal of bird droppings.

F. Contractor shall use anti-bacterial personal protection products when working around surfaces that contain bird waste.

3.2 MATERIALS

A. **Netting System**:

1. Netting shall be installed taunt and flat within 1/16" diameter stainless-steel cable framework. All netting to framework connections shall be stainless-steel crimps with a maximum closed inside diameter of 3/16".

2. Holes for anchorage must be drilled in mortar joints only where deemed necessary and by Architect approved shop drawings. Holes shall be no more than 3/16″ in diameter and 1″ deep.

3.3 FILED INSPECTION

A. Visually inspect all installation surfaces and correct deficiencies.

3.4 CLEANING

A. At the end of each day, the contractor shall remove all rubbish and discard all materials.

END OF SECTION 10290

SECTION 10280 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories
2. Custodial accessories

B. Related Sections:
1. Section 09400 - Marble/Ceramic Tiling

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.8 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, by the following company or Architect approved equal:

1. American Specialties, Inc., 441 Saw mill River Road, Yonkers, NY 10701; 914 476-9000; www.americanspecialities.com

B. Toilet Tissue Dispenser:

1. Basis-of-Design Product: ASI 9031.
2. Description: Profile collection Semi-Recessed Twin Hide-a-Roll Toilet Paper Dispenser
3. Mounting: Semi-Recessed.
4. Toilet Tissue Dispenser Capacity: Two 4-1/2" or 5-1/4" inch diameter tissue rolls.
5. Toilet Tissue Dispenser Operation: Non-control delivery with theft-resistant spindles.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Lockset: Tumbler type.

C. Combination Paper Towel, Waste Receptacle and Hand Dryer:

1. Basis-of-Design Product: ASI 64672-1.
2. Description: Recessed Combo Three-in-One Paper Towel Dispenser with Waste Receptacle and Automatic Electric Hand Dryer
3. Mounting: Recessed.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.

D. Mirror Unit:

1. Basis-of-Design Product: American Specialties; 0600.
2. Frame: Full-Length Stainless-steel channel.

    a. Corners: Welded and ground smooth.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
    b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: 14" wide x 24" high.

E. Grab Bars:

1. Basis-of-Design Product: American Specialties;

    a. Swing-up Grab Bar: Model No. 3413
    b. Fixed Grab Bar: Type-01.

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

   a. Finish: Smooth, No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: as indicated on Drawings.

F. Counter Mounted Liquid-Soap Dispenser:

1. Basis-of-Design Product: Bobrick B-822.
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Deck mounted on vanity.
4. Capacity: 34 fl oz..

2.3 CUSTODIAL ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.

B. Mop and Broom Holder:

1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
2. Length: 36 inches (914 mm).
3. Hooks: Three.
4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

   a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
   b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

C. Utility Hook:

1. Basis-of-Design Product: Bobrick B-670.

2.4 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10280

SECTION 142423 – HYDRAULIC PASSENGER ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY AND DEFINITIONS

A. Related Documents

1. Division 01 - Supplementary General Conditions
2. 14 24 23 - Hydraulic Passenger Elevators

1.2 DESCRIPTION

A. Work Included: The extent of the work is indicated on the drawings.

B. Work of this Section includes labor, materials, tools, equipment, appliances and services required to manufacture, deliver and install the units complete as shown on the drawings, as specified herein, and/or as required by job conditions.

C. The work and/or requirements specified in all sections is described in singular with the understanding that identical work shall be performed on all units or associated systems unless otherwise specified herein.

D. The work shall include, but is not limited to the following:

1. One (1) 3,500 lbs. capacity stage holeless hydraulic passenger elevator operating at 150 fpm serving three (3) stops, front only.

E. Intent

1. This section includes hydraulic passenger elevators.
2. The following outlines the scope of work covered in this Section: Provide and install one (1) hydraulic elevator as described above. Special attention should be paid to the dimensional characteristics of this elevator as a new hoistway is being constructed within the existing building and overhead is very limited on this project.
3. Related equipment shall be designed, constructed, installed and adjusted to produce the highest results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance, and the highest standard of safety.
4. It is not the intent of these specifications to detail the construction and design of all parts of the equipment, but it is expected that the type, materials, design, quality of work and construction of each part shall be adequate for the service required, durable, properly coordinated with all other parts, and in accordance with the best commercial standards applicable and of the highest commercial efficiency possible.
5. Electric and magnetic circuits and related parts shall be of proper size, design and material to avoid heating and arcing, and all other objectionable effects which may reduce the efficiency of operation, economy of maintenance and/or net-useful life of the apparatus.
6. Minimum requirements for design, materials, etc., are for certain parts of the

equipment. Equivalent requirements approved by the Consultant shall apply to such parts as are of special design, construction or material and to which the specified requirements are not directly applicable. These minimum requirements as a whole shall be considered as establishing proportionate general minimum standards for all parts of the equipment.

7. The Consultant may permit variations from the requirement of these specifications to permit use of the Contractor's standard equipment, provided such standard equipment is in every way adequate for the intended use and meets the full intent of these specifications. All such variations proposed by the manufacturer shall be called to the attention of the Consultant and shall only be made if approved in writing prior to the award of the contract.
8. General requirements for design, materials and construction are intended primarily to apply to the heavy-duty and important parts of the equipment specifically mentioned and to other parts of similar duty and importance. Less important and light-duty parts may be of the standard design, materials and construction provided that, in the opinion of the Consultant, such standards are in accordance with the best commercial practice and are fully adequate for the purpose of use. All such variations shall be made only on the Consultant's written approval.
9. All equipment and component parts installed, supplied or provided under this contract shall be manufactured and distributed by a third-party, non-installer company servicing the vertical transportation industry.

    a. Apparatus shall conform to the design and construction standards referenced herein, and shall be rated the best commercial grade suitable for this application.
    b. Equipment and component systems shall not employ any experimental devices or proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance repairs or adjustments by all qualified contractors.
    c. Manufacturers of the apparatus shall provide technical support and parts replacements for their equipment and component systems for a minimum of twenty (20) years, and issue such guarantee of support to the purchaser with written certification naming the final Owner of their product(s) to ensure the apparatus or systems remain maintainable regardless of who may be selected for future service.

10. All equipment provided shall be factory and field tested with a history of design reliability and net-useful life established.

    a. Contractor must be able to demonstrate the apparatus to be installed has been used successfully in a substantially similar manner under comparable conditions.
    b. If the apparatus proposed differs substantially in construction, material composition, design, size, capacity, duty or other such rating from the equipment previously used for the same purpose by the manufacturer, the Consultant may reject the apparatus or require the vendor test and demonstrate the adequacy and suitability for this particular situation. Any necessary tests shall be performed at the sole expense of the Contractor with no prior guarantee of acceptance after the testing procedure.

11. The Contractor shall not use as part of the permanent equipment any experimental devices, proprietary design, components, construction of materials which have not

been fully tried out in at least substantially similar or under comparable service, except as may be especially approved by the Consultant. If any important equipment or devices to be used on this installation differ substantially in construction, materials, design, size, capacity or duty from corresponding items previously used for the same purpose by the manufacturer, they shall pass such tests as the Consultant may require to fully show their adequacy and suitability. These tests shall be in addition to tests herein specified and shall be made at the expense of the Contractor.

12. Certain design limitations, tests, etc., are herein specified as a partial check of the adequacy of design, construction and materials used. These requirements do not cover all features necessary to ensure satisfactory and approved operation, etc., of the equipment.
13. It is understood, the entire system shall be designed, fabricated, modified and/or upgraded in full compliance with applicable local laws and code standards. The absence of a particular item or requirement shall not relieve the Contractor of the full and sole responsibility for such equipment, features and/or procedures.
14. With the exception of only those items specifically identified as being performed by others, the Specifications are intended to include all engineering, material, labor, testing, and inspections needed to achieve work specified by the Contract Documents. Inasmuch as it is understood that any incidental work necessary to complete the project is also covered by the Specifications, bidders are cautioned to familiarize themselves with the existing job site conditions. Additional charges for material or labor shall not be permitted subsequent to execution of the Contract.
15. Bidders must report discrepancies or ambiguities occurring in the Specifications to the Consultant for resolution prior to the bidding deadline, otherwise the Specifications shall be deemed acceptable in their existing form.

F. Termination of Existing Agreement(s)

1. By submitting a bid, the existing maintenance provider agrees that any service contract(s) in effect shall be terminated by the Owner should the project be awarded to another vendor upon 30 day written notice to the Contractor by the Owner.

    a. The contract(s) shall be terminated with no penalty to the Owner or Contractor.
    b. Owner will be responsible for money owed the Contractor for services provided and work performed up until the date of cancellation.

G. Codes and Ordinances / Regulatory Agencies

1. Work specified by the Contract Documents shall be performed in compliance with applicable Federal, State, and municipal codes and ordinances in effect at the time of Contract execution. Regulations of the Authority Having Jurisdiction shall be fulfilled by the Contractor and Subcontractors. The entire installation, when completed, shall conform with all applicable regulations set forth in the latest editions of:

    a. Local and/or State laws applicable for logistical area of project work.
    b. Building Code applicable to the AHJ.
    c. Elevator Code applicable to the AHJ.
    d. Safety Code for Elevators and Escalators, ASME A17.1 and all supplements as modified and adopted by the AHJ.

e. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
f. Safety Code for Existing Elevators and Escalators, ASME A17.3 as modified and adopted by the AHJ.
g. Guide for emergency evacuation of passengers from elevators, ASME A17.4.
h. National Electrical Code (ANSI/NFPA 70).
i. American With Disabilities Act - Accessibility Guidelines for Building and Facilities and/or A117.1 Accessibility as may be applicable to the AHJ.
j. ASME A17.5/CSA-B44.1 - Elevator and escalator electrical equipment.

2. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.
3. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.

H. Green Building General Requirements

1. Implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certified Rating. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-sourced materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in the sections below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by this Contractor or its Subcontractors, shall not be allowed if such changes compromise the stated GREEN BUILDING Performance Criteria.
2. For products and materials used and/or installed under this Section as required under the GREEN BUILDING PERFORMANCE REQUIREMENTS, complete the ENVIRONMENTAL MATERIALS REPORTING FORM (See Section 01300 Submittals). Information to be supplied on this Form includes the name of the product, the name of the vendor, plus:

a. Volatile Organic Compound (VOC) content in grams/liter or lbs/gallon (note: cost data requested on FORM is not required for items when reporting only VOC content).
b. Provide back-up documentation to validate all information on the ENVIRONMENTAL MATERIALS REPORTING FORM, except cost data. For each material listed on the Forms, provide documentation to certify each of the material attributes (e.g., local source, VOC content), per the requirements of Section 01300 Submittals.
c. Provide product cut sheets with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project.
d. The GREEN BUILDING Submittal information outlined above shall be assembled into one (1) package per Specification section or sub-contractor. Two (2) copies of the submittal are required. Incomplete or inaccurate LEED Submittals may be used as the basis for rejecting the submitted products or assemblies.

3. Provide the following documentation on the ENVIRONMENTAL MATERIALS REPORTING FORM:

   a. Adhesives, Sealants, Paints and Coatings used within the weather envelope of the building: meet the requirements of Section 01510 "Environmental Practices." List each product and its VOC content. Certification of these products shall be in accordance with the GREEN BUILDING SUBMITTAL REQUIREMENTS.

I. Definitions

1. Defective Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Provide: Where used in this document, provide shall mean to install new device, apparatus, system, equipment or feature as specified in this document.
3. Definitions in ASME A17.1 as amended or modified by the AHJ apply to work of this Section.

1.3 PERMITS AND SUBMITTALS

A. Permits

1. Comply with the requirements of Division 01.
2. Prior to commencing work specified by the Contract Documents, the Contractor shall, at its own expense, obtain all permits or variances as may be required by the AHJ and provide satisfactory evidence of having obtained said permits and variances to both the Owner's Representative and Consultant.
3. File necessary drawings for approval of all Authorities Having Jurisdiction.

B. Submittals

1. Comply with the requirements of Division 01.
2. Submit the following

   a. Samples

Item No.	Quantity	Size	Description
S1	3	12" x 12"	Exposed finishes as requested by Architect
S2	1	Actual	Each fixture as requested by the Architect
S3	1	Actual	Mitered, corner construction of entrance frame

   b. The samples shall be:

1) Held on site after inspection and used as a standard for acceptance or rejection of subsequent production units.
2) Labeled to identify their intended use and relation to the documents, e.g., car finishes, control panel, etc.
3) Returned to the elevator contractor at the completion of the project.

Subject to approval, where an item of equipment is a standard item, copies of the manufacturer's catalogue or brochure may be accepted provided that all dimensions and relevant information are shown in the catalogue or brochure.

c. Shop Drawings - Submit computer generated layout drawings for approval. Include the following:

1) A listing of all components, devices and sub-systems including:

a) Manufacturer and location of plant
b) Size and model number

2) Machine room plan indicating:

a) Location of equipment
b) Service connections
c) Power unit weight
d) Oil line and conduit routing
e) Reactions

3) Fully dimensioned hoistway plan and section of each unit indicating:

a) Platform (with cab), hoistway and entrance dimensions
b) All running clearances
c) Location of fixtures
d) Buffers, service ladders and pit reactions
e) Location of inserts
f) Rail Reactions

4) Entrance details
5) Sill support detail
6) Fixture details including hall lanterns, hall pushbutton stations, car operating panel, etc.
7) Wiring diagrams
8) Insert diagrams
9) Cab details including wall, ceiling, base, handrail, lighting, fixtures, front return and transom plans and sections

3. Calculations

a. Rail loads
b. Pit and machine room reactions
c. Heat emissions in machine room
d. Electrical loads including, accelerating and running currents. Include all auxiliary

loads.

e. Submit design calculations identifying seismic design forces and support capacities. Calculations shall be certified by a registered professional engineer.

4. LEED Submittal Package: Provide validation for each LEED Focus Material (LFM) according to the Action Submittals requirements of Division 01 "Sustainable Design Requirements" including a completed line item on the LEED Reporting Form for each LEED Focus Material. Validation includes at a minimum.

   a. VOC Content.

C. Measurements and Drawings

1. Drawings or measurements included with the bidding material shall be for the convenience of the bidders only and full responsibility for detailed dimensions lies with the Contractor.
2. In the execution of the work on the job, the Contractor shall verify all dimensions with the actual conditions.
3. Where the work of the Elevator Contractor is to join other trades, the shop drawings shall show the actual dimensions and the method of joining the work of the various trades.

D. Substitutions

1. Requests for substitutions will be considered under the following time limitations and situations:

   a. Not less than ten (10) calendar days before bids are due.
   b. Work or equipment specified becomes unavailable through unforeseen events such as strikes, loss of manufacturer's plant through fire, flood or bankruptcy.

2. Requested substitutions will be reviewed and adjudged. Failure of the Consultant to raise objection shall not constitute a waiver of any of the requirements of the Contract Documents.
3. Request for substitutions shall include complete data with drawings and samples as required, including the following:

   a. Quality Comparison - Proposed substitution versus the specified product.
   b. Changes required in other work because of the substitution.
   c. Effect on the construction schedule.
   d. Cost Data - Resulting from the proposed substitution versus the specified product. The Contractor shall certify that the cost data presented is complete and includes all related costs under this Contract.

4. When proposing a substitution, the Contractor represents that:

   a. They have investigated the proposed substitution and have determined that it is equal to or better than the product specified.
   b. They will guarantee the substitution in the same manner as the product specified.

c. They will coordinate and make other changes as required in the work as a result of the substitution.
d. They waive all claims for additional costs as a result of the substitution, with the exception of those identified above under "cost data".

5. The Consultant will be sole judge of the acceptability of the proposed substitution.
6. The Consultant will have authority to approve or reject substitutions or to change the specified standards of quality. However, neither this authority to act under this provision nor any decision made in good faith, either to exercise or not to exercise this authority, shall give rise to any duty or responsibility of the Consultant to the Contractor, any Subcontractor, any Sub-Subcontractor, any of their agents or employees or any other persons performing the work or offering the perform the work.

E. Changes in Scope and Extra Work

1. The Owner may at any time make changes in the specifications, plans and drawings, omit work, and require additional work to be performed by the Contractor.

a. Each such addition or deletion to the Contract shall require the Owner and the Contractor to negotiate a mutually acceptable adjustment in the contract price, and, for the Contractor to issue a change order describing the nature of the change and the amount of price adjustment.
b. The Contractor shall make no additions, changes, alterations or omissions or perform extra work except on written authorization of the Owner.
c. Each change order shall be executed by the Contractor, Owner, and the Consultant.

F. Keys

1. Upon the initial acceptance of work specified by the Contract Documents on each unit, the Contractor shall deliver to the Owner, six (6) keys for each general key-operated device that is provided under these specifications in accordance with ASME A17.1, Part 8 standards as may be adopted and modified by the AHJ.
2. All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Part 8 as may be adopted and modified by the AHJ.

G. Diagnostic Tools

1. Prior to seeking final acceptance of the project, the Contractor shall deliver to the Owner any specialized tools required to perform diagnostic evaluations, adjustments, and/or programming changes on any microprocessor-based control equipment installed by the Contractor. All such tools shall become the property of the Owner.

a. Owner's diagnostic tools shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.
b. Owner's diagnostic tools that require periodic re-calibration and/or re-initiation shall be performed by the Contractor at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final

acceptance of the project.

c. The Contractor shall provide a temporary replacement, at no additional cost to the Owner, during those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair.

2. Contractor shall deliver to the Owner, printed instructions, access codes, passwords or other proprietary information necessary to interface with the microprocessor-control equipment.

H. Printed Circuit Boards, Software Programs and Spare Parts

1. Prior to seeking final acceptance of the completed project as specified by the Contract Documents, the contractor shall prove adequate stock locally or must be available within twenty-four (24) hours for delivery to the job site from remote facilities a full set of spare replacements for each printed circuit board and associated software that is needed to fully operate any one (1) elevator.
2. During the life of the equipment and subject to the term of the maintenance agreement, where revisions to firmware and/or software are issued by the control manufacturer or manufacturer of solid state and microprocessor based subsystems subsequent to the beneficial use of the equipment, updates shall be provided so that the installation and spare circuit boards are current with respect to software and firmware versions.

I. Wiring Diagrams, Operating Manuals and Maintenance Data

1. Comply with the requirements of Division 01.
2. Deliver to the Owner, four (4) identical volumes of printed information organized into neatly bound manuals prior to seeking final acceptance of the project.
3. The manuals shall also be submitted in electronic format on non-volatile media, incorporating raw 'CAD' and/or Acrobat 'PDF' file formats.
4. Manuals, as well as electronic copies, shall contain the following:

   a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control and motor drive equipment.
   b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
   c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.
   d. Method of control and operation.

5. Provide four (4) sets of "AS INSTALLED" straight-line wiring diagrams in both hard and electronic format in accordance with the following requirements:

   a. Displaying name and symbol of each relay, switch or other electrical component utilized including identification of each wiring terminal.
   b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
   c. Supplemental wiring changes performed in the field shall be incorporated into

the diagrams in order to accurately replicate the completed installation.

6. Furnish four (4) bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.
7. Manuals or photographs showing controller repair parts with part numbers listed.

J. Training

1. Prior to seeking final acceptance of the project, the Contractor shall conduct a four-hour training program on-site with building personnel selected by the Owner.
2. The focus of the session shall include:

   a. Instructions on proper safety procedures to utilize in assisting passengers that may become entrapped inside an elevator car.
   b. Explain each control feature and its correct sequence of operation.

3. Control features covered shall include but, not be limited to:

   a. Independent Service Operation.
   b. Emergency Fire Recall Operation - Phase I
   c. Emergency In-car Operation - Phase II.
   d. Emergency Power Operation.
   e. Emergency Communications Equipment.
   f. Security Operating Features.

K. Patents

1. Patent licenses which may be required to perform work specified by the Contract Documents shall be obtained by the Contractor at its own expense.
2. The Contractor agrees to defend and save harmless the Owner, Consultant and agents, servants, and employees thereof from any liability resulting from the manufacture or use of any patented invention, process or article of appliance in performing work specified in the Contract Documents.

L. Advertising

1. Advertising privileges shall be retained by the Owner.
2. It shall be the responsibility of the Contractor to keep the job site free of posters, signs, and/or decorations.
3. Contractor's logo shall not appear on faceplates or entrance sills without the approval of the Owner.

1.4 QUALITY ASSURANCE

A. Materials and Quality of Work

1. All materials are to be new and of the best quality of the kind specified.
2. Installation of such materials shall be accomplished in a neat manner and be of the highest quality.

a. Should the Contractor receive written notification from the Owner stating the presence of inferior, improper, or unsound materials or quality of installation, the Contractor shall, within twenty-four (24) hours, remove such work or materials and make good all other work or materials damaged.

b. Should the Owner permit said work or materials to remain, the Owner shall be allowed the difference in value or shall, at its election, have the right to have said work or materials repaired or replaced as well as the damage caused thereby, at the expense of the Contractor, at any time within one (1) year after the completion of the work; and neither payments made to the Contractor, nor any other acts of the Owner shall be construed as evidence of acceptance and waiver.

B. Mechanical Design Requirements (General)

1. The following typical requirements shall apply to all parts of the work where applicable and are supplementary to other requirements noted under the respective headings.

a. All bearings, pivots, guides, guide shoes, gearing, door hanger sheaves, door hanger tracks and similar elements subject to friction or rolling wear in the entire elevator installation shall be accurately and smoothly finished and shall be arranged and equipped for adequate and convenient lubrication. Means shall be provided for flushing and draining the larger bearings and gear case. All oiling holes shall have dustproof, self-cleaning caps.

b. Important supporting bearings of other parts in motion when the elevator is traveling shall, unless otherwise specified or approved, be of ball or roller bearing type.

c. All plain bearings shall be liberally sized in accordance with the best commercial elevator usages which have proved entirely satisfactory on heavy-duty installations.

d. Bearings of motors shall be arranged and equipped for adequate automatic lubrication. Ring or chain oilers, spring-fed grease cups and equivalent devices properly used in accordance with the best commercial elevator practice will be acceptable. Approved means shall be provided for visibly checking the amount of lubricant contained and for flushing and draining. Means shall also be provided for preventing leakage of lubricant when the reservoirs or grease cups are filled to proper levels.

e. Ball and roller bearings shall be of liberal size and of a type and make which have been extensively and successfully used on other similar, heavy-duty elevator installations. They shall be fully enclosed. Loading, lubrication, support and all other conditions of use shall be in accordance with the recommendations of the bearing manufacturer based on previous extensive and satisfactory elevator usage.

f. All armature spiders and similar items intended to rotate with their shafts shall be keyed and/or firm press or shrunk fit on the shafts. Set screw fastening will be permitted only for minor items not subject to hoisting loads and where means for field adjustment is required.

g. All bolts used to connect moving parts, bolts carrying hoisting stresses and all other bolts, except guide rail bolts, subject to vibration or shock shall be fitted with adequate means to prevent loosening of the nuts and bolts. Bolts

transmitting important shearing stresses between machine parts shall have tight body fit in drilling holes.

h. All machine work, assembling and installing shall be done by skilled and experienced mechanics using first-class, modern equipment and tools. All work shall be thoroughly high grade in every respect. All parts will be manufactured to high precision standards so that wearing parts will be readily interchangeable with stock repair parts with a minimum of field fitting.

i. All bearing and sliding surfaces of shafts, pins, bearings, bushings, guides, etc., shall be smoothly and accurately finished. They shall be assembled and installed in accurate alignment and with working clearance most suitable for the load, speed, lubrication and other conditions of use.

j. Structural steel used for supporting and securing equipment and for the construction of car slings, etc., shall conform to the A.S.T.M. specification for Structural Steel for Buildings. Design stresses shall not exceed those specified in the local Building Code.

k. Castings of motor frames, sheaves, etc., shall be of the best quality metallurgically controlled, hard, close grained gray machinery cast iron, free from blow holes, sand holes, or shrinkage cracks, ground to remove overruns, sanded and machined so as to leave a finish suitable for its particular application.

C. Electrical Design Requirements (General)

1. The following typical requirements shall apply to all parts of the work and are supplementary to other requirements noted under the respective headings.

a. The design and construction of the motors shall conform to the requirements of these specifications and to the ASME Standards for Rotating Electrical Machinery with revisions issued to the first day when the work of this Contract was advertised.

1) Motors shall operate successfully under all loads and speeds and during acceleration and deceleration.

2) Motors shall be designed for quiet operation without excessive heat.

3) Insulation on motor coils and windings and on all insulated switch, relay, and other coils shall conform to the requirements for Class "H" insulation, as defined in ASME Standards for Rotating Electrical Machinery. All motors shall be impregnated twice.

4) Switches, relays, etc., on controller, starter and signal panels and similar items on other parts of the equipment shall be the latest improved type for the condition of use. They shall function properly in full accordance with the requirements of the machines controlled and with the specified operating requirements of the elevator. Any of these parts showing wear or other injurious effects during the guarantee period to the extent that abnormal maintenance is required or indicated shall be replaced with proper and adequate parts by the Contractor.

5) Contacts in elevator motor circuits which are intended to be opened by governors or other safety devices shall be copper to carbon or other approved non-fusing type.

6) Where required, controllers and other component parts of the installation

shall be labeled in accordance with the latest codes and standards as adopted and/or otherwise modified by the AHJ.

7) Electrical equipment, motors, controllers, etc., installed under this contract shall have necessary CSA/US or UL/US listing as may be required by the AHJ. Equipment shall be labeled or tagged accordingly.

D. Materials, Painting and Finishes

1. Two (2) coats of rust inhibiting machinery enamel shall be applied to exposed ferrous metal surfaces in the pit that do not have a galvanized, anodized, baked enamel, or special architectural finishes.
2. Two (2) coats of rust inhibiting enamel paint to the machinery located within the machine room as well as to the machine room floors.
3. Architectural metal surfaces of bronze or similar non-ferrous materials which are specified to be refinished, reclad and/or provided new, shall be sufficiently clear coated so as to resist tarnishing during normal usage for a period of not less than twelve (12) months after final acceptance by the Owner.
4. Identify all equipment including buffers, crosshead, machine, controller, drive, disconnect switch, etc., by 4" high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
5. Paint or provide decal-type floor designation not less than six (6) inches high on hoistway doors (hoistway side), fascias and/or walls as required by Code at intervals not exceeding 7'-0". The color of paint used shall contrast with the color of the surface to which it is applied.

E. General

1. Cold-rolled Sheet Steel Sections: ASTM A1008, commercial steel, Type "B".

   a. Shop Prime: Factory-applied baked on coat of mineral filler and primer.
   b. Finish Paint: Two coats of low sheen baked enamel, color as selected by the Architect.
   c. Steel Equipment: Two coats of manufacturer's standard rust-inhibiting paint.

2. Steel Supports and Reinforcement: ASTM A36
3. Stainless Steel Bars and Shapes: ASTM A276
4. Stainless Steel Tubes: ASTM A269
5. Aluminum Extrusions: ASTM B221
6. Structural Tubing: ASTM A500
7. Bolts, Nuts and Washers: ASTM A325 and A490.
8. Clear Tempered Glass: ASTM C1048

F. Qualifications

1. The work shall be performed by a company specialized in the business of manufacturing, installing and servicing conveying systems of the type and character required by these specifications with a minimum of ten (10) years experience.
2. Prior written acceptance is required for manufacturers other than those listed, before quoting this project. Requests for acceptance will not be considered unless they are submitted before bid date and are accompanied by the following information:

a. List of five (5) similar installations having exact equipment being proposed for this project arranged to show name of project, system description and date of completed installation. The list shall include the names, position and resumes of the construction team and field supervisor of the installations.
b. Complete literature, performance and technical data describing the proposed equipment. Include the names, position and resumes of the proposed construction team and field supervisor.
c. List of ten (10) service accounts by building name, building manager or owner, including phone numbers.
d. Location of closest service office from which conveying system will be maintained.
e. Location of closest parts inventory for this installation.
f. List of the names, positions and resumes of the construction teams and field supervisor for the installation.

1.5 DELIVERY / STORAGE / HANDLING / COORDINATION

A. Delivery and Storage of Material and Tools

1. Comply with the requirements of Division 01.
2. Delivery, Storage and Handling:

   a. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to accepted samples.
   b. Store materials under cover in a dry and clean location, off the ground.
   c. Remove delivered materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.

3. The Owner shall bear no responsibility for the materials, equipment or tools of the Contractor and shall not be liable for any loss thereof or damage thereto.
4. The Contractor shall confine storage of materials on the job site to the limits and locations designated by the Owner and shall not unnecessarily encumber the premises or overload any portion with materials to a greater extent than the structural design load of the Facility.

B. Work With Other Trades / Coordination

1. Coordinate installation of sleeves, block outs, equipment with integral anchors, and other items that are embedded in concrete or masonry for the applicable equipment. Furnish templates, sleeves, equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to the equipment scheduled for installation including pit ladders, sumps, and floor drains in pits; entrance subsills; machine beams; and electrical service, electrical outlets, lights, and switches in pits and machine rooms, secondary levels, overhead sheave rooms and hoistways as it relates to the specific equipment.

C. Removal of Rubbish and Existing Equipment

1. On a scheduled basis, the Contractor shall remove from the job site all rubbish generated in performing work specified in the Contract Documents.
2. Any component of the existing elevator plant that is not reused under the scope of work specified in the Contract Documents shall become property of the Contractor and, as such, shall be removed from the premises at the Contractor's sole expense.
3. The Contractor agrees to dispose of the aforementioned equipment and rubbish in accordance with any and all applicable Federal, State, and municipal environmental regulations, and further accepts all liability that may result from handling and/or disposing of said material.

D. Protection of Work and Property

1. The Contractor shall continuously maintain adequate protection of all their work from damage and shall protect the Owner's property from injury or loss arising out of this contract.
2. The Contractor shall make good any such damages, injury or loss, except such as may be directly caused by agents or employees of the Owner.
3. The Contractor shall provide all barricades required to protect open hoistways or shafts per OSHA regulations. Such protection shall include any necessary guards or other barricades for employee protections during and after the modernization procedure.

E. Temporary Elevator

1. There may be a requirement for the use of an elevator during construction. Provide an alternate price for:

   a. Temporary car enclosure.
   b. Required guards and protective barriers.
   c. Power and lighting.
   d. Any special labor related to such temporary service.

2. The Contractor shall also include all charges connected with:

   a. Testing of the unit(s) for acceptance by the AHJ.
   b. Maintenance required for temporary service.

3. All equipment shall be restored to a "like new" condition at the Contractor's expense prior to acceptance of the work by the Construction Manager.

1.6 RELATED WORK

A. Work By Elevator Contractor Included in the Base Bid

1. The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance.

   a. Provide a permanent fixed metal ladder.

1) Ladder shall extend no less than 48″ above the sill of the access door. Handgrips shall extend from the ladder to a point no less than 48″ above the sill of the access door where the ladder does not comply.
2) The rungs shall be a minimum of 12″ wide. Where prevailing conditions prevent a 12″ wide rung, the rung may be reduced to no less than 9″.
3) The rungs shall be spaced 12″ on center.
4) A clear distance of no less than 4 ½″ from the centerline of the rungs and handgrips to the nearest permanent object in back of the ladder shall be provided.

a) Where prevailing conditions prohibit the installation of the required ladder as specified above, the Elevator Contractor shall coordinate requirements necessary for compliance with the Authority Having Jurisdiction.

b. Provide a standard railing conforming to Code on the outside perimeter of the car top on all sides where the perpendicular distance between the edges of the car top and the adjacent hoistway enclosure exceeds 300 mm (12 in.) horizontal clearance or as otherwise required by the Authority Having Jurisdiction.

B. Work By Others

1. The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance.

a. Installation of new main line power feed with related disconnect switch designed and located per local law requirements.
b. Installation of auxiliary power feed with related distribution panel(s) and disconnect(s) designed and located per local law requirements.

1) Voltage shall be 110 VAC with one 15 Amp circuit breaker or fuse for lighting of each individual elevator car enclosure.
2) Circuit breakers and/or fused disconnects shall be lockable in the "OFF" position in accordance with applicable code.

c. The top surface of any setback or projection in the hoistway that measures 2″ or more in width shall be beveled at an angle of not less than 75 degrees from horizontal, constructed from prime painted 14 gauge cold-rolled steel and installed so as to conform with ASME A17.1 elevator safety code as modified by, and/or in addition to codes and standards accepted by the AHJ.
d. Installation of new permanent lighting fixtures with protective guards and 110 volt duplex GFI receptacles inside the machine room. Illumination shall be no less than 30 foot-candles at floor level. A light control switch shall be provided immediately adjacent to the machine room entrance door. Provide necessary receptacles as required by Elevator Contractor to supply power to auxiliary elevator equipment and/or remotely located monitors.
e. Provide machinery spaces of the secondary level directly below the machine room with permanent lighting fixtures having protective guards and a duplex GFI receptacle. Illumination shall be no less than 19 foot-candles at floor level.

A light control switch shall be provided immediately adjacent to the secondary level entrance door/ladder in accordance with code.

f. Provide each elevator pit with a 110 volt GFI duplex receptacle and a permanent lighting fixture equipped with protective guard. Illumination shall be no less than 10 foot-candles at pit floor level. A light control switch shall be provided and so positioned as to be readily accessible from the pit entrance door or ladder.

g. Installation of hoistway and machine room smoke relief provisions in accordance with local laws.

h. Provide each machine room, secondary space and pit with a self-closing, self-locking access door. Locking means shall be spring-type arranged to permit the doors to be opened from the inside without a key.

i. Provide a smoke detector system meeting the requirements of A17.1 and/or the Local Governing Authority.

j. Installation of fire emergency control interface provisions for automatic recall of the elevator(s) through operation of the fire detection system. Provisions shall be made for alternate designated fire recall landing with connection contingent on Codes recognized by the local governing authority. The interfacing contacts shall be wired to an electrical junction box located inside each elevator machine room for connection to the elevator control systems by the Elevator Contractor. Each wire shall be clearly labeled with its control function. Coordinate the type of interface required for the specific elevator control apparatus with the Elevator Contractor.

k. Where sprinkler fire protective systems are provided inside any elevator hoistway, machine room or associated machinery space, provisions shall be made for the disconnecting of the main line power supply from the affected elevator prior to activation. This means of disconnect shall be manually reset in accordance with code.

l. Installation of emergency power control interface provisions to signal the elevator control apparatus of a transfer from normal (utility) power to the building emergency (generator) power supply. Also, provide additional control interface to give advanced notification to the elevator control apparatus that the power source will transfer from emergency (generator) power to normal (utility) power. Interfacing contacts shall be wired to an electrical junction box located inside each machine room for connection to the elevator control equipment by the Elevator Contractor. Coordinate the type of interface required for the specific elevator control apparatus with the Elevator Contractor.

1) On the line side of each main line disconnect switch, provide some means to absorb power that may be regenerated by the elevator hoist motor during emergency power operation.

2) Normal Power/Emergency Power Control Signals consisting of two (2) dry contacts provided by others to function as follows:

a) One (1) dry contact normally open to make when Normal Power is available. (Logic state of dry contact is to be confirmed by the Manufacturer of the Elevator Control Equipment).

b) One (1) dry contact normally open to make when emergency power is available. (Logic state of dry contact is to be confirmed

by the Manufacturer of the Elevator Control Equipment).

m. Installation of HVAC provisions inside the machine room so as to maintain ambient temperature and humidity levels that are within the range specified by the microprocessor-control equipment manufacturers.
n. Provide a class "ABC" fire extinguisher in electrical machinery and control spaces. Locate the extinguisher in close proximity to the access door.
o. Provide necessary telephone wiring with connection to local telephone service for remote elevator monitoring and/or two-way voice emergency communications systems.

    1) Terminate the telephone wiring in junction boxes or standard phone jack terminals in the machine room.
    2) Coordinate the quantity and termination method of individual phone connections with the Elevator Contractor.
    3) Identify each phone line for connection by the Elevator Contractor to the appropriate elevator device(s).
    4) Telephone wiring, where required by applicable codes, shall be installed in conduit.

p. Sumps in pits where provided, shall be covered. The cover shall be level with the pit floor so as not to produce a tripping hazard.

1.7 WARRANTY / MAINTENANCE SERVICES

A. Contract Close-Out, Guarantee and Warranties

1. Comply with the requirements of Division 01.
2. Guarantee and Warranties:

    a. Warrant the equipment installed under these specifications against defects in material and quality of installation and correct any defects not due to ordinary wear and tear or improper use of car which may develop within one year from the date each elevator is completed and placed in permanent operation and accepted by the Owner.
    b. This warrantee shall be written and issued at the completion of each unit prior to final payment.

B. Maintenance

1. Provide full protective maintenance on the specified equipment for a period of twelve (12) months from the date of final acceptance of the entire installation.
2. 24 hour emergency callback service between regular examinations shall be available, but regular time callbacks shall be included at no extra cost to the Owner. The response time shall not exceed one (1) hour.
3. Maintenance work shall be performed by personnel under supervision and in direct employ of manufacturer and installer.
4. Provide interim maintenance on the units that are completed and put in service prior to the overall project completion.

5. Perform maintenance work during the regular working hours of regular working days of the trade.
6. Maintenance shall include systematic examination, adjustment and lubrication of all equipment and apparatus, including repair or replacement of electrical and mechanical parts of the equipment and apparatus. Repair equipment whenever required and use only genuine standard parts produced and manufactured for equipment concerned.
7. Supply all necessary lubricants, cleaning materials and repair parts required to keep installations in good working order during maintenance periods.
8. Adequate stock of spare parts for maintenance or repair work and minor callback service repairs shall be stocked within the confines of the building in areas designated and assigned by the Owner.
9. Additional parts of other equipment required for maintenance and repair of the systems may be stored at the Contractor's facilities with the understanding delivery of same for emergency procedures must be made within four (4) hours to the job site.
10. Other materials and equipment normally not stocked by the Contractor locally must be available within twenty-four (24) hours for delivery to the job site from remote facilities and/or Supplier Contractors responsible to the Contractor for stocking the materials or equipment.
11. If the requirements for stockade of parts as defined herein are not met on any item, the Contractor shall immediately notify the Owner in writing as to the circumstances and provide a confirmed delivery date for the required materials and equipment.

C. Long-Term Maintenance

1. Long-term full comprehensive maintenance and related services shall be provided in accordance with the maintenance guidelines here in under the Contractor's Form of Full Protective Maintenance Services submitted with the bidding documents with coverage and response as further specified above.

1.8 AUXILIARY SYSTEMS / TESTING PROCEDURES

A. Emergency Power Selector Panel Operation and Testing (EPO Sequencer)

1. Visual signals and operating devices noted in the following testing procedure are included in the "Emergency Power Selector Panel" section.

   a. Automatic Mode: If an elevator is requested to return to the main floor, the selector panel lamp will pulse on and off. When this elevator has accepted the request to return, the lamp will illuminate continuously. When the elevator has returned to the main floor, the lamp will extinguish.

2. Emergency Power Operation

   a. Automatic Mode:

      1) If an elevator is requested to return to the main floor, the selector panel lamp will pulse on and off. When this elevator has accepted the request to return, the lamp will illuminate continuously. Means shall be provided

adjacent to the selector switch(es) to indicate that the elevator is at the designated level with the doors in the normally open position.

b. Other E.P.O. Functions and Supplemental Descriptions

1) Prior to commencing emergency generator testing, a contingent of personnel familiar with elevator, emergency generator and any other power systems tied into the emergency generator must have communications established between the respective parties, preferably through the use of walkie-talkies or other battery-supported communication devices.

2) Testing of Transfer from Normal to Emergency Power

a) Pre-transfer Switch (Test Mode) - At the emergency generator area a test signal to the elevator equipment must be provided before start of emergency generator testing. This signal must be brought to the elevator dispatch controllers via a "dry contact". (Dry contact logic to be determined by the Manufacturer of the Elevator Control Equipment.) This signal will immediately cause all elevators connected to the system to perform a normal slow down sequence and stop at the nearest available floor. All cars will stop and park with doors open.

b) Emergency generator will now be "on line" and when the generator ATS (Automatic Transfer Switch) is energized, connecting the elevator load to the emergency generator, the test signal should be turned "off". Moving the test switch to "off" will signal the elevator computer to commence automatic recall upon sensing emergency power transfer has occurred. (Depending on the requirements of the Elevator Equipment, a second set of contacts may be required to indicate that the emergency generator is on-line and to begin the automatic sequential return program.)

c) Immediate automatic selection of an elevator via built-in software, will return the selected elevator to the main lobby, open the doors and remove the elevator from service. The next elevator in the sequence will be automatically selected to be brought down.

d) After all cars that are able to be brought down and secured (with doors open), one car (the "duty" car) will be chosen by on-board controller software to run on emergency power operation.

e) If the selected "duty" car, automatically chosen by the controller software, is not desired, an alternate car can be selected by turning the Emergency Power Panel "Auto/Manual" keyed switch to the "Manual" position and move the "Emergency Panel Selection" switch to the position corresponding to the desired car. (The "Manual" key switch must remain in the "Manual" position for the chosen car to remain in service).

f) When another car is chosen with an elevator in motion, the car which was running at the time will return to the lobby, open doors and be removed from service. The chosen car will then go into service.

g) The emergency panel will be simplified so as to have an

"Automatic Position" and "Manual Position". These positions will be keyed the same as the firemen's service keys in the designated lobbies.

3) Testing of Transferring Emergency Generator to Normal Power

a) Prior to transferring to normal power, a "Pre-Transfer" signal shall be provided by the "ATS". Should an automatic "Pre-Transfer" signal not be provided, the assigned person at the "Emergency Generator Area" should operate the pre-transfer test switch "on".
b) The elevator which was running on the emergency generator will stop automatically at the nearest landing and park with the doors open.
c) The emergency generator can now be disconnected and normal power connected upon notification from building personnel that the elevator has parked and is not in motion.

1.9 ALTERNATES / ALLOWANCES / UNIT PRICES

A. Allowances

1. Carry the following allowances for the elevators:

a. Cab: $25,000.00 per cab

2. The above allowances are exclusive of any handling charge, applicable sales and/or use taxes. Wiring, installation and coordination of allowance items shall be included in the base contract.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. Elevator PE1

1.	Quantity	One (1)
2.	Type	Holeless Hydraulic Passenger
3.	Capacity (lbs.)	3500
4.	Speed (fpm)	150
5.	Travel in Feet	25'-10" Verify on drawings
6.	Number of Landings	Three (3)
7.	Number of Openings	Three (3) – 1*, 2, 3
8.	Front Openings	All
9.	Rear Openings	None
10.	Operation	Simplex selective collective
11.	Control	AC for Hydraulics
12.	Fireman's Control	Phase I and II
13.	Number of Push Button Risers	One

14.	Cab Size	6′-8″ wide x 5′-4″ deep
15.	Guide Rails	Steel tees, provide rail backing as required
16.	Buffers	Coil Springs
17.	Car Door Size	3′-6″ wide x 7′-0″ high
18.	Hoistway Door Size	Same as car door
19.	Door Operation	Single speed side opening
20.	Machine Type	Hydraulic Pump
21.	Power Supply	208-3-60
22.	CCTV and Card Reader	By Others
23.	CCTV and Reader Cable	Required
24.	Entrances	Stainless steel bolted frames w/No. 4 finish
25.	Landing Fixture	
	a. Typical Landings	Stainless steel w/No. 4 finish
	b. Lobby Landing	Stainless steel w/No. 4 finish
26.	Cab Enclosure	$25,000 allowance/As further specified.

2.2 MANUFACTURERS

A. Pre-Approved Equipment Manufacturers

1. In addition to Original Equipment Manufactures', the following manufacturer's equipment and materials have been pre-approved for use on this project.
2. Other manufacturers/products not specifically mentioned below shall be considered for approval on an individual basis.

    a. Controller - GAL (GALaxy), Motion Control Engineering, Elevator Controls Corporation, Elevator Systems, Inc., Smartrise.
    b. Tracks, Hangers, Interlocks and Door Operators - G.A.L., ECI.
    c. Fixtures - G.A.L., Adams, EPCO, Monitor, E-Motive USA, C.E. Electronics, Innovation, MAD, National.
    d. Door Protective Device - Janus, Adams, G.A.L., T.L. Jones, Tri-Tronics.
    e. Cabs and Entrances - Columbia, EDI/ECI, National Cab & Door, Tyler, Velis, Gunderlin, Eklund, EMCO.
    f. Motors - Imperial Electric, General Electric, Baldor, Reuland Electric.
    g. VVVF Power Drives - Mitsubishi, MagneTek, Yaskawa, TorqMax.
    h. VVVF Emergency Power Systems – MCE, Reynolds & Reynolds Electronics.

2.3 GUIDE RAILS

    a. Electrical Traveling Cables – Draka, James Monroe
    b. Hydraulic Systems/Components - Canton, ECS Corporation, Elevator Equipment Corporation, Mongrain Vertical Transport (MVT), MEI
    c. Guide Shoes/Rollers – ELSCO, G.A.L.
    d. Intercommunications/Telephones - Webb Electronics, K-Tec, Ring, Wurtec, Janus, approved equal.

2. Original Equipment Manufacturers may substitute their own branded equipment subject to the following:

a. All requirements of the specifications are met regarding performance, appearance, serviceability and support.
b. A full stock of all regular and critical replacement parts required for this project are maintained at a facility within fifty (50) miles of the project site.

    1) Any parts not stocked at the above referenced facility shall be identified with the location of the nearest source and shall be available for next-day delivery upon demand.

c. All parts and software shall be made available for purchase to a qualified elevator maintenance firm within one-business day delivery without direct Owner involvement.

    1) Provide details of parts supply facility and a list of current parts pricing for all major components required for the installation.

d. All specialized tools, equipment, software, and passwords, required to maintain, repair, adjust the operation, and perform code mandated inspections are provided to the Owner as part of the base installation.

    1) Updates to these items shall be available via the parts supply facility referenced above.

e. Technical support of the product(s) shall be available to the Owner's elevator service provider.

2.4 CONTROL FEATURES / OPERATION

A. Simplex Selective Collective Operation

1. Provide simplex selective collective operation from a riser of hall push button stations.
2. The registration of one or more car calls shall dispatch the car to the designated floors. The car shall also respond to registered hall calls in the same direction of travel. Car and hall calls shall be canceled when answered.
3. Stops in response to calls that are registered in either the car or corridor pushbutton stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered.
4. When the car has responded to the highest or lowest call, and calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
5. When the car arrives at its last stop and reverses direction of travel, all previously registered car calls shall be automatically cancelled.
6. When the car has responded to the highest or lowest call, and hall calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
7. When the car arrives at a landing where both up and down hall calls are registered, it will answer the call in the direction of travel.

a. After a pre-determined delay, if no car call is registered, the car shall be assigned to respond to calls registered for the opposite direction. Car doors shall close immediately, re-open and respond to the call for the opposite direction.
b. Hall lantern operation shall always correspond to direction of service.

8. When an empty car reverses direction at a landing with no hall calls, the doors shall not open and the hall lantern shall not operate.
9. If the car has no car calls registered and arrives at a floor where both up and down hall calls have been registered, the car shall respond to the hall call corresponding to the direction of car travel. If, after making its stop, a car call is not registered and no other hall calls exist ahead of the car corresponding to its original direction of travel, the doors shall close and immediately reopen in response to the hall call for the opposite direction.
10. The car shall maintain its original direction at each stop until the doors are fully closed to permit a passenger to register a car call before the car reverses its direction of travel.

B. Motion Control

1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs.
2. Use digital logic to calculate optimum acceleration and deceleration patterns during each run.

   a. The amplitude of acceleration and deceleration shall not exceed 2.6-2.8 ft./ sec^2 .
   b. The maximum jerk rate shall be 1.5 to 2.0 times the acceleration and deceleration.
   c. The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within ± 3% of the rated speed.

3. Floor leveling accuracy of ± 1/4″ as measured between the car entrance threshold and the landing sill on any given floor shall be provided.

   a. This accuracy standard shall be maintained under varying load conditions and without need for releveling corrections caused by overshooting or stopping short of the floor.

4. Elapsed flight time during a typical elevator one floor run shall not exceed values as further specified.

   a. Timing, as measured between the moment door closing operations begin and when the doors are 3/4 open at the next adjacent floor, shall remain consistent under varying load conditions in either direction of travel.

C. Independent Service Operation

1. The car operating station shall be equipped with a key-operated switch labeled "IND SER".
2. Locate the switch in the locked access compartment.
3. When placed in the "on" position the following shall occur:

    a. Group elevator - the elevator shall bypass corridor calls and travel directly to any floor chosen by registration of a car call. Hall calls shall remain registered for service by another elevator in the group.
    b. Simplex elevator - existing hall call registrations shall extinguish and hall buttons shall remain inoperative as an indication to passengers that there is no elevator service.

4. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or car call registration pushbutton, is pressed and maintained until the doors are fully closed.
5. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.
6. In case an elevator is operating on the Independent Service mode and the Fire Emergency Recall system becomes activated, the elevator shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation following a period of approximately forty-five (45) seconds.

D. Inspection Service Operation

1. Provide a key operated switch in the main car operating panel that, when turned to the 'ON' position, shall cause the elevator to be removed from service and placed in Inspection Service Operation.
2. Limited operation of the car shall be provided through pressing the Attendant Service up and down momentary push buttons (if provided) or the highest or lowest car call push buttons (if up and down buttons are not provided) in the main car operating panel only.
3. The car shall move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with both the hall and car door panels in the closed and locked position.
4. The Inspection Service switch shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. The top of the elevator car shall be equipped with a control for limited operation of the car during repairs, maintenance and inspection conducted in the hoistway. The transfer of control to the top of car operating device shall cause that device to be the sole means of control for the elevator.
6. Power door operating equipment shall be rendered inoperative while the car is being operated in the Inspection Service mode with the exception of power closing of the door. The control system shall maintain closing power on the door while the elevator is moving under Inspection Service Operation.
7. The in-car Inspection Service switch shall be rendered ineffective when the top of car inspection control is activated.
8. Machine Room Inspection Operation and Inspection Operation with open door circuits shall be provided in accordance with A17.1 Safety Code where required or allowed by the AHJ.

E. Hoistway Access Operation

1. Provisions shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with the hall and car doors in the open position to obtain access to the top of the car.
3. The car shall automatically stop motion when the car top is level with the hoistway door sill.
4. The access key switch(es) shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. Access operation shall be disabled when top of car inspection operation is in effect.

F. Fire Emergency Operation

1. Firefighters Service Operation and devices shall meet applicable code requirements of the AHJ.
2. Contractor shall be responsible for compliance in all aspects of Firefighters Service including, but not limited to the mode of operation, initiation of operation, operating /control and signaling devices as well as fixture engraving including operating instructions applicable to and where required by the specific Jurisdiction.

G. Emergency Power Operation

1. Upon loss of normal power, and establishing of emergency power, elevator shall automatically resume normal operation.
2. An illuminated signal marked "ELEVATOR EMERGENCY POWER" shall be provided in the elevator lobby at the designated level to indicate that the normal power supply has failed and the emergency power is in effect.
3. Prior to return to normal power, the building ATS shall provide a "pre-transfer" signal to the elevator equipment that will initiate the landing of elevators prior to transfer from emergency power to normal power.

    a. Timer of the pre-transfer signal shall be adjustable from 15 to 30 seconds.

4. The following additional requirements apply:

    a. Firemen's Service Operation will remain active at all times during emergency power operation.
    b. All car lighting will remain active with car lighting on separate "emergency power feeders" and additional battery back-up.
    c. Communications will remain active all times via emergency power source feeder and additional battery back-up.
    d. Remote monitoring, where provided, will be active from each group dispatcher for selected elevators using an uninterrupted power supply (UPS) to maintain the central processing unit during power transfers.
    e. Position indicator for the elevator will be active in the elevator and security room (where applicable), as well as Lobby display panels.

5. Testing of elevators under emergency power shall be accomplished with the building ATS providing a "pre-test" signal to the elevator control apparatus.

    a. The pre-test signal shall initiate the landing of the elevators prior to the transfer from normal to emergency power.
    b. After testing, the building ATS shall provide a "pre-transfer" signal to land the elevators prior to the transfer from emergency to normal power.

H. Hospital Emergency Service Operation

1. Activation of any individual corridor emergency switch shall remove the car from automatic group operation for immediate response to the emergency demand floor.
2. An emergency demand shall cancel or override all registered car calls for this elevator unless the system is functioning under fire emergency control operations, attendant service or independent service.
3. When "Hospital Emergency Service" is activated while this elevator is operating under a special mode as specified above, the "in-car" audible and visible signals shall alert the operator to place the car back in automatic mode for immediate response.
4. Upon arrival at an emergency activated floor, the elevator shall remain parked for an adjustable timed period of one (1) to five (5) minutes or until the "in-car" emergency switch is activated for emergency service independent operation.
5. The elevator shall remain on emergency independent service until the "in-car" switch is returned to the normal operating mode.

I. See "Fixtures" for specific hall station and car operating panel requirements.

J. Emergency Exit Door Scare Alarm / Emergency Return Operation

1. This feature shall be designed to detect the disruption of normal elevator operation by opening or tampering with the top of car emergency escape hatch.

    a. This feature shall automatically cause the car to immediately return non-stop to the main floor with the car door closed and the car alarm bell constantly sounding.
    b. The elevator door shall remain closed when the elevator reaches the main floor landing until the hall call button is pressed on the lobby station.
    c. The car push button station, including the open and close buttons, shall be inoperative when the emergency return system is in operation.
    d. This feature shall operate as described above, regardless of whether the elevator is in control by automatic service, or attendant service.
    e. This feature shall be disabled when the elevator is on Fire Emergency Service.

K. Low Oil Protection and Protective Device

1. Provide low oil protection operation and appropriate device(s) that will discontinue operation of the hydraulic elevator pump when:

    a. The elevator stalls due to a low oil condition
    b. Fails to reach the landing in the up direction

2. Pressure Switch

   a. Where the top of the cylinder head is above the top of the tank, provide a pressure switch between the cylinder and the valve which shall be activated by the loss of pressure at the top of the cylinder, and control the operation of the elevator as required by Code.

3. Provide an additional protective device that shall automatically return the elevator to the bottom landing, open the door and shut down the system.
4. The protective device shall be an integral part of the control system.

L. Hydraulic Auto Lowering

1. Provide automatic battery powered lowering feature for the hydraulic elevator.

   a. In the case of normal power outage, the elevator shall be automatically lowered to the Main Lobby level.
   b. The door shall open automatically to discharge passengers.
   c. The elevator shall remain parked with its door closed and door open button operative until normal power is restored.

2. The control panel shall be located in the machine room or be an integral part of the control system.

   a. It shall include necessary batteries, solid-state controls, charger, monitor lights and a test button.
   b. It shall be fed by a 120 volt, 20 Ampere branch circuit from the emergency power source, provided by others.

3. Provide necessary circuitry within the controller to determine the difference between an "intentional" loss of power and an "actual" loss of power in order to prevent operation of the auto lowering unit when the main line disconnect has been opened for elevator servicing.
4. Provide necessary terminals for connection to an auxiliary switch in main line disconnect provided by others.

M. Door Operation

1. Car and hoistway doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel.

   a. Door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 feet per second in accordance with governing code.
   b. Door operation shall commence as the car stops level at the floor and the machine brake is applied. Pre-door opening shall not be permitted.

2. Door open and door close time shall be measured between the moment car door operation in either direction begins and the instant at which that cycle is completed.
3. When responding to either a car or corridor call, the amount of time that the elevator

door remains stationary in the open position shall be adjustable up to sixty (60) seconds.

a. Door open dwell time for a corridor call shall be separate of that for a car call, and in both cases, dwell time shall be canceled whenever the car door protection device is momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the door protection device is cleared of obstructions.

4. The operation of the door protective device by physical contact (mechanical safety-edge) or the interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
5. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per applicable Code requirements.
6. Each car operating station shall be provided with a "door open" and "door close" push button.

   a. Pressure on the "door open" button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button.
   b. The "door open" buttons shall also control the open cycle during Phase II - Emergency In-car Operation.
   c. The "door close" push button shall function on Independent Service, Attendant Service and Phase II - Emergency In-car Operation as well as during normal automatic operations.

7. Repeated attempts by the power door operator to open or close the door at any landing shall be monitored by the control system.

   a. In the event the door fails to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.

8. Each hoistway door shall be provided with an automatic self-closing mechanism arranged so that the door shall close and lock if the car should leave the landing while the hoistway door is unlocked.
9. Car doors shall be arranged to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

2.5 MACHINE ROOM EQUIPMENT

A. Control Equipment

1. Provide a microprocessor-based elevator control system.

2. Digital logic shall calculate optimum acceleration, deceleration and velocity patterns for the car to follow during each run.
3. Closed-loop distance and velocity feedback shall monitor the actual performance of the elevator car with the desired speed profile.
4. System operating software shall be stored in non-volatile memory.

    a. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static motor drive units, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors.
    b. All electrical wiring inside the control equipment cabinet shall be performed in a neat manner with field wiring terminated at stud blocks provided inside the control cabinet.
    c. Each wiring terminal shall be clearly identified according to the nomenclature used on the "as built" wiring diagrams. No more than two (2) field wires may be connected to any single terminal stud.
    d. Spare wires shall be tagged according to their point of termination, bundled, and placed at the bottom of the control equipment cabinet.
    e. Each electrical component within the cabinet shall be permanently identified with symbols, identical to those used on the "as-built" wiring diagrams.
    f. A data plate that indicates the edition of the Code in effect at the time of installation and/or alteration shall be provided in accordance with applicable code and requirements of ASME A17.1 Code. The data plate shall be in plain view and securely attached on the mainline disconnect or on the controller.
    g. Control equipment shall comply with requirements of all applicable Sections of the ASME A17.1 Code as approved and adopted by the AHJ.
    h. The manufacturer's standard on-board "LCD" display shall be incorporated on the main processor board and/or otherwise incorporated in the controller cabinet. The "LCD" shall be capable of providing alpha-numeric characters to view the operational status of the elevator and/or group functions depending on the application. The display shall provide the user with necessary information for troubleshooting and reprogramming of the basic system parameters.

        1) Where the "LCD" is not an integral part of the controller and troubleshooting/reprogramming requires the use of a separate tool, the tool shall be maintained in the machine room and accessible to service personnel. This tool, along with all technical documentation for the correct use of the tool, shall remain the property of the Owner.
        2) Password protection of critical programming features is required to prevent accidental changes to life-safety and other non-typical control settings.

B. Equipment Isolation

1. Provide effective sound isolation between machines, solid state motor drive units and any filters, from building structure to reduce noise transmission to occupied spaces and elevators and elevator cabs.
2. When operating per plans and specifications, the elevator equipment shall not generate noise levels in excess of NC-40 in occupied tenant spaces and shall be free

of pure tones. For the purposes of this specification, a pure tone shall be defined as a sound level in any one-third octave band which is greater than 5 dB above both adjacent one-third octave bands, in the range 45 to 11,200 Hz.

3. Provide the following as a minimum:

    a. Resiliently isolate the entire elevator/secondary deflector integral unitized base from the elevator machine room floor slab by means of effective neoprene-in-shear isolators having a minimum static deflection of 3/8".
    b. Isolate the transformers and reactance units from the building structure by means of approved neoprene-in-shear isolators having a minimum static deflection of 3/8".
    c. Solid state rectification units shall be mounted on 3/4" thick minimum, neoprene-in-shear pad isolators and an effective electrical filter/reactance limiting electrical noise shall be provided.
    d. Use flexible conduit with ground wire for motor, machine, drive, governor and position/velocity transducer connections.

C. Hydraulic Power Unit / Motor

1. Provide a self-contained power unit which includes:

    a. Structural steel outer base
    b. Tank support
    c. Oil tight drip pan
    d. Floating inner base to prevent metallic contact for mounting the motor pump assembly.
    e. Sound isolation panels to enclose the unit and reduce airborne noise.

2. Provide a reinforced overhead oil reservoir with a tight fitting tank over the oil control unit which includes:

    a. An oil fill strainer with air filter
    b. An oil level gauge assembly
    c. A self-cleaning strainer in the suction line.

3. The pump shall be for oil hydraulic elevator service with positive displacement screw type design for steady discharge with minimum vibration.
4. The drive shall be by multiple V-Belts and sheaves or directly driven by a submersible pump depending on the HP requirements of the system.

    a. The use of submersible pumps having more than a 40 HP motor is unacceptable.

5. Pump drive motor control shall utilize solid state motor starter circuitry to provide reduced current starting and maximum protection of the motor.
6. The oil control unit shall be of the manufacturer's own design but shall include relief, safety check, start and slow down valves.

    a. Use lowering and leveling valves for drop away speed, lowering speed, leveling speed and stopping speed to insure smooth down starts and stops.

b. Provide a valve for manual lowering of the elevator car in event of power failure and for use in servicing and adjusting the elevator mechanism.
c. Design the tank shut-off valve for isolating oil in the power unit tank to ensure each of servicing and adjusting the elevator mechanism without removing oil from the tank.
d. All valves shall be accessible for adjustment without removing the assembly from the oil line.

7. Manufacture the unit to operate under 400 psi (for dry units) / 600 psi (for submersible units) working pressure.
8. Provide the manufacturer's standard oil cooler sized and designed to maintain a maximum oil temperature of 125 degrees F in a machine room conditioned to operate at a maximum ambient temperature of 95 degrees F.
9. Provide a thermostatically controlled heater in the oil tank to maintain proper operating oil temperature.
10. Provide a baffle muffler in-line to minimize noise under all conditions. Bladder type mufflers shall not be acceptable.

2.6 HOISTWAY EQUIPMENT

A. Guide Rails / Inserts / Brackets

1. Provide machined, standard size steel "T" section guide rails with tongue and grooved joints for the car and counterweight. Use not less than 15.0 pound car rails.
2. Use not less than 3/4" thick machined steel fishplates to form rail joints. Connect rails to fishplate with four (4) bolts.
3. The section modulus and moment of inertia of the fishplates shall not be less than that of the rail. Connect rails to fishplate with four (4) bolts.
4. For concrete and concrete block hoistways furnish rail brackets and provide inserts and an insert location drawing to Construction Manager or General Contractor.
5. Brackets shall be used to support the rails from the hoistway framing and/or inserts.

   a. The rails shall be attached to the brackets by heavy clamps or clips.
   b. Bolting or welding rails to brackets shall only be allowed in certain instances.
   c. Do not attach brackets to the top flange of hoistway framing steel.

6. Provide rail backing where the vertical distance between support framing is greater than 14'-0" and no intermediate support framing is shown on the drawing.
7. All guide rails shall be erected plumb and parallel to a maximum deviation of 1/8 inch (plus or minus 1/16 inch).
8. Provide oversized steel members and brackets for the rails where the distances exceed the manufacturer's standard dimensions.

B. Roller Guides

1. Provide roller guide shoes with adjustable mounting base, rigidly bolted to the top and bottom of each side of the car and counterweight frame.

   a. Roller guides shall consist of a set of sound reducing polyurethane wheels in

precision bearings held in contact with the three finished rail surfaces by adjustable stabilizing springs.

b. The bearings shall be sealed or provided with grease fittings for lubrication.
c. Equip roller guides with adjustable stops to control postwise float.
d. Fit the top car roller guides with galvanized, painted or powder coated steel guards.

C. Electrical Conduit / Wiring / Traveling Cable

1. Electrical wiring shall be provided.

a. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
b. Electrical wiring provided for hoistway interlock shall be of a flame retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or equivalent.
c. Each run of electrical conduit or duct shall contain no less than 10% spare wires and, in any case, no fewer than two (2) spare wires.
d. Crimp-on type wire terminals shall be used where possible.

2. Traveling cable shall be provided.

a. Each traveling cable shall be provided with a flame and water resistant polyvinyl chloride jacket.
b. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
c. Each traveling cable shall contain no less than 10% spare wires.
d. Traveling cable exceeding 100′ in length shall be provided with a steel wire rope support strand from which the cable shall be suspended.
e. Traveling cable must be contained within an approved electrical conduit to within 6′ of the final suspension point in the hoistway.
f. Each traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 20 gauge wire and arranged to contain no less than one (1) coaxial cable for CCTV remote monitoring.
g. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud blocks provided for that purpose.

1) Each wiring terminal shall be clearly identified by its nomenclature as shown on the "as built" wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.

h. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of 30x the cable diameter is provided.
i. Pre-hang the cables for at least 24 hours with ends suitably weighted to eliminate twisting during operation.

3. Rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.

    a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized.

        1) Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.

    b. The use of flexible metal conduit shall be limited to runs not greater than 3′ in length.

D. Normal and Final Terminal Stopping Devices

1. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravel, independent of the operating devices, final terminal stopping device and the buffers.
2. Provide final terminal stopping devices to stop the car and counterweight automatically from the speed specified within the top clearance and bottom overtravel.
3. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the cam fixed to the top of the car.

    a. Terminal stopping devices that are not mechanically operated (i.e.: magnetic proximity) shall be provided by the manufacturer of the control equipment, intended for use as a terminal limit, and designed for reliable operation in the hoistway environment.

4. Final terminal limits shall be pinned so as to prevent movement after final adjustment where required by the AHJ.

E. Emergency Terminal Stopping Device

1. Provide necessary emergency terminal stopping devices where static motor control is used at speeds over 200 feet per minute.

    a. Operation of the device shall be independent of the operation of the normal terminal stopping device.
    b. Arrange the device to remove power from the driving machine motor and brake should the normal terminal stopping device fail to cause the car to slow down at the terminal as intended.

2.7 PIT EQUIPMENT

A. Car Buffers

1. Provide buffer with necessary blocking and horizontal steel braces under the car.
2. Provide spring type buffers for elevators with operating speeds of up to and including

200 fpm.

3. The buffer shall be tested and approved by a qualified testing laboratory.
4. Provide a permanent buffer marking plate which indicates the manufacturer's name, identification number, rated impact speed and stroke.
5. Support buffers from the pit floor level with all required blocking and bracing steel members.

B. Pit Stop Switch

1. Where pit depth does not exceed 67", each elevator pit shall be provided with a push/pull or toggle switch that is conspicuously designated "EMERGENCY STOP" and located so as to be readily accessible from the hoistway entrance on the lowest landing served at a height of approximately 18" above the floor.

   a. This switch shall be arranged to prevent the application of power to the hoist motor and machine brake when placed in the "OFF" position.

C. Jack Unit

1. Design and construct the jack unit in accordance with the applicable requirements of the ASME Code.
2. The jack shall be of sufficient size to lift the gross load at the rated speed to the height specified and shall be factory tested to ensure adequate strength and freedom from leakage.
3. No brittle material, such as gray cast iron, shall be used in the jack construction.
4. The jack unit shall consist of:

   a. A plunger of heavy seamless steel tubing turned smooth and true to ± 0.15 inches tolerance, and with no diameter change greater than .04 inches per foot of length.
   b. A stop ring electrically welded to the plunger to prevent plunger leaving its cylinder.
   c. Internal guide bearing.
   d. Cylinder head with removable packing gland to facilitate replacement of packing.
   e. A drip ring below cylinder head to collect oil.
   f. A bleeder valve to release gases from the system.

5. Install jacks plumb and attach them to heavy-duty clamps to guide rail brackets and/or to building structure.

D. Hydraulic Check Valve

1. A check valve shall be provided and installed so that it will hold the elevator with rated load at any point when the pump stops and the down valves are closed or the maintained pressure drops below the minimum operating pressure.

E. Overspeed (Rupture) Valve

1. Where required by Code, an overspeed valve shall be provided and installed so that it

will cause the flow of oil from the hydraulic jack through the pressure piping to cease when such flow exceeds a preset value relative to car speed in accordance with applicable codes.

F. Scavenger Pump

1. Provide a positive displacement, rotary type pump for the hydraulic elevator.

   a. The pump shall have a 1/3 HP motor capable of pumping 100 ft. vertically.
   b. The pump shall be self-priming and self-lubricating.
   c. The pump shall be equipped with a 100 mesh screen strainer.
   d. The pump housing shall be constructed of brass with stainless steel internal parts, and shall have a 3.5 gallon reservoir.

2. Mount oil return pump off the pit floor and connect it to the jack unit and the oil tank with copper tubing.

2.8 HOISTWAY ENTRANCES

A. Hoistway Entrance Structure

1. Frames - The frames shall be constructed of 14 gauge sheet steel.

   a. Passenger Elevators - Provide stainless steel with No. 4 standard bolted type construction having matching end caps. Provide 2" wide square profile.

2. Doors - The doors shall be constructed of 16 gauge sheet steel, not less than 1-1/4" thick, reinforced to accept hangers, interlocks or door closers.
3. Equip all hoistway landing doors with one-piece full height non-vision wings of material and finish to match hall side of door panels. The doors shall be as follows:

   a. Passenger Elevators – All Floors: Stainless steel with No. 4 finish.

4. Entrances shall bear 1 ½ hour label of Underwriters Laboratories, Inc.
5. Provide each door panel with two removable laminated plastic composition guides, arranged to run in sill grooves with a minimum clearance, replaceable without removing the door from the hangers and incorporating a steel fire stop.
6. For PE1 Provide the leading edge of door panels with continuous black rubber astragal bumper strips.

   a. The strips shall be relatively inconspicuous when the doors are closed and shall be easily replaced.

7. Provide rubber bumpers at the top and bottom of the door to stop them at their limit of travel in opening direction.
8. Sills - Provide narrow-type, extruded sills with the nosing approximately one (1) inch deep and running the full length of door travel.

   a. The sills shall be at least 3/8 inch thick.
   b. The wearing surface shall be of a non-slip type.

c. Rigidly secure the sills to the building construction by means of steel sill support brackets or blocking with necessary metal shimming or adjustments.

1) Passenger Elevator – At all Floors - Extruded aluminum

d. Provide and rigidly secure sill support members to the building structure after blocking and leveling them with necessary metal shimming.

1) Use 4" x 4" x ¼" angle for single speed entrances and 5" x 5" x 3/8" angle for two speed entrances.
2) If formed sheet steel sill support members are used, the structural properties of these members shall match or exceed the structural properties of 4″ x 4″ x ¼″ angle for single speed entrances, and 5″x 5″ x 3/8″ angle for two speed entrances.

9. Struts - Provide 3" x 3" x 1/4" hot rolled steel angle struts.

a. If formed sheet steel struts are used, the structural properties of formed struts shall match or exceed the structural properties of 3" x 3"x 1/4" steel angle.
b. Extend the struts from top of sill to either the bottom of floor beam or intermediate framing above.
c. Bolt struts in place with not less than two (2) bolts at each end.
d. Strut clip angles or brackets shall have a thickness not less than the thickness of the supported strut.

10. Track Support - 3/16 inch thick steel track support plate shall extend between and be bolted to the vertical steel struts with no less than two (2) bolts at each end.
11. Track Covers – 16 gauge steel cover plates shall extend the full travel of the doors.

a. Covers shall be made in sections for service access to hangers, sheaves, tracks and interlocks.
b. The sections above the door opening shall be movable from within the elevator car.
c. Cover fastening devices shall be non-removable from the cover.

12. Fascias – 16 gauge steel fascia plates shall extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws.

a. Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.

13. Toe Guards – Provide 16 gauge steel toe guards to extend 12 inches below any sill not protected by fascia.

a. The toe guards shall extend the full width of the door and shall return to the hoistway wall at a 15 degree angle and be firmly fastened.

14. Dust Covers – Provide 16 gauge steel dust covers to extend 6 inches above any header not protected by fascia.

a. The dust covers shall extend to a full width of travel of the doors, return to the hoistway wall at a 15 degree angle and be firmly fastened.

15. The bottom of each horizontally sliding hoistway door panel shall be equipped with guiding members and safety retainers in accordance with A17.1 Safety Code as adopted and/or modified by the AHJ.

    a. The bottom hoistway door panel safety retainers shall be of stainless steel "Z" bar design, or shall be otherwise designed to prevent displacement of the door panel.

B. Tracks / Hangers / Closers / Related Equipment

1. Formed or extruded steel landing door hanger tracks shall be provided.
2. Each landing door panel shall be suspended from a pair of door hanger assemblies that are compatible with the hanger tracks.

    a. Hanger assemblies shall be directly mounted to the door panel using 3/8" diameter or better hardware.
    b. Solid steel blocks shall be used where job-site conditions dictate the use of spacers between hanger assemblies and the landing door panel.
    c. Hanger assemblies shall be adjusted or shimmed so that door panels are suspended in a plumb manner with no more than 3/8" vertical clearance to the cab entrance threshold.
    d. Upthrust rollers shall be adjusted for minimal operating clearance against the bottom edge of the hanger track.
    e. Means shall be provided to prevent hangers from jumping the track.
    f. Blocks shall be provided to prevent rollers from overrunning the end of the track.

3. Each set of center opening landing doors shall be provided with a cable driven relating mechanism which is compatible for use with the door hanger assemblies.

    a. The relating mechanism shall be properly tensioned and adjusted so as to equalize the relationship between the door panels and the hoistway entrance.

4. Each set of single speed side slide landing doors shall be provided with a sill-mounted spring closing mechanism.

    a. Spirator-type spring closers shall be acceptable should prevailing sill depth or runby clearance conditions require their use.

C. Interlocks / Unlocking Devices

1. Each set of landing doors shall be provided with a complete electromechanical interlock assembly.

    a. Each interlock assembly shall consist of:

        1) A switch housing with contacts
        2) Lock keeper

3) Clutch engagement/release subassembly
4) Associated linkages

b. Arrange the lock so that individual leading door panels (side slide or center opening) are locked when in the closed position.

2. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Consultant.
3. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing a drop-leaf type access key at all landings served.

a. Each hoistway door shall accommodate manufacturer's standard lock release key with escutcheon.

1) The key hole shall be fitted with a metal ferrule that matches the door finish.
2) Drilling key holes in the field will not be accepted.

2.9 CAR EQUIPMENT / FRAME

A. Car Frame and Platform

1. The car frame shall be made of steel members, with the required factor of safety.
2. The car platform shall consist of a steel frame with necessary steel stringers, all securely welded together.
3. The frame and platform shall be so braced and reinforced that no strain will be transmitted to the elevator car.

a. Provide platform with two (2) layers of 3/4" thick marine grade plywood.
b. Cover the underside of the car platform with sheet steel.

4. The support frame shall carry rubber pads on which the platform shall rest without any connection to the steel frame for sound and vibration isolation.
5. Provide extruded aluminum thresholds having non-slip surface, guide grooves.
6. Sound isolate all passenger elevator platforms with vibration isolation pads. The support frame shall carry rubber pads on which the platform shall rest without any connection to the steel frame.
7. Recess the passenger elevator platforms to receive finished flooring as selected by the Architect and specified under another section of their specification.
8. The car frame shall be sized for an 8'-0" overall cab height to achieve a maximum of 12'-0" overhead.
9. Design the elevator frames and platforms for elevator PE4 for a Class A freight loading.

B. Top-of-Car Inspection Operating Station

1. An inspection operating station shall be provided on top of the elevator car.
2. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
3. When the station is operational, all operating devices in the car shall be inoperative.

4. Provide the following control devices and features:

    a. A push/pull or toggle switch designated "EMERGENCY STOP" shall be arranged so as to prevent the application of power to the hoist motor or machine brake when in the "off" position.
    b. A toggle switch designated "INSPECTION" and "NORMAL" to activate the top of car Inspection Service Operation.
    c. Push button designated "Up", "Down" and "Enable" to operate the elevator on Inspection Service (the "Enable" button shall be arranged to operate in conjunction with either the "Up" or "Down" button).
    d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

C. Emergency Exit / Top

1. Ensure they operate as per code and have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.
2. No other key to the building shall unlock the emergency exit lock except access switch keys which may be keyed alike.

    a. Keys shall be assigned in accordance with ASME A17.1 Group 1 Security requirements.

D. Car Enclosure Work Light / Receptacle

1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110 volt GFI receptacle.
2. Light control switches shall be located for easy accessibility from the hoistway entrance.
3. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than 24" above the crosshead member of the car frame.
4. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

E. Master Door Power Operator System – VVVF/AC

1. Provide a heavy-duty master door operator on top of the elevator car enclosure for power opening and closing of the cab and hoistway entrance door panels.
2. Operator shall utilize an alternating current motor, controlled by a variable voltage, variable frequency (VVVF) drive and a closed-loop control with programmable operating parameters.

    a. System may incorporate an encoder feedback to monitor positions with a separate speed sensing device or an encoderless closed-loop VVVF-AC control to monitor motor parameters and vary power applied to compensate for load changes.

3. The type of system shall be designated as a high speed operator, designed for door panel opening at an average speed of 2.0 feet per second and closing at approximately 1.0 foot per second.

a. Reduce the closing speed as required to limit kinetic energy of closing doors to within values permitted by ASME A17.1 as may be adopted and/or modified by the AHJ.

4. The door shall operate smoothly without a slam or abrupt motion in both the opening and closing cycle directions.

   a. Provide controls to automatically compensate for load changes such as:

      1) Wind conditions (stack effect)
      2) Use of different weight door panels on multiple landings
      3) Other unique prevailing conditions that could cause variations in operational speeds.

   b. Provide nudging to limit speed and torque in conjunction with door close signaling/closing and timing devices as permitted by ASME A17.1 as may be adopted and/or modified by the AHJ. Nudging shall be initiated by the signal control system and not from the door protective device.

5. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall permit emergency manual operation of both the car and corridor doors only when the elevator is located in the floor landing unlocking zone.

   a. The hoistway door shall continue to be self-locking and self-closing during emergency operation.
   b. The door operator and/or car door panel shall be equipped with safety switches and electrical controls to prevent operation of the elevator with the door in the open position as per ASME A17.1 Code Standards.
   c. Provide zone-lock devices as required by ASME A17.1 as may be adopted and/or otherwise modified by the AHJ.

6. Construct all door operating levers of heavy steel or reinforced extruded aluminum members, designed for stress and forces imposed on the related parts, linkages and fixed components during normal and emergency operation functions.

   a. All pivot points shall have either ball or roller-type bearings, oilite bronze bushings or other non-metallic bushings of ample size.

7. Provide operating data / data tag permanently attached to the operator as required by applicable code and standards.

F. Car Door Panel(s)

1. Provide standard 1" thick, 14 gauge hollow metal flush construction panel(s), reinforced for power operation and insulated for sound deadening.
2. Paint the hoistway side of each panel black and face the cab side with 16 gauge sheet steel finished in No. 4 stainless steel, matching the returns or in selected material and finish as otherwise directed by Owner/Architect.
3. The panels shall have no binder angles and welds shall be continuous, ground smooth

and invisible.

4. Drill and reinforce panels for installation of door operator hardware, door protective device, door gibs, etc.

    a. Provide each door panel with two removable laminated plastic composition guides, arranged to run in the sill grooves with minimum clearance.
    b. The guide mounting shall permit their replacement without removing the door from the hangers.

5. Provide the meeting edge of center opening doors with necessary continuous rubber astragal bumper strips.

    a. These strips shall be relatively inconspicuous when the doors are closed.

G. Door Reopening Device

1. Provide an infrared curtain door protection system.
2. The door shall be prevented from closing and reopen when closing if a person interrupts any one of the light rays.
3. The door shall start to close when the protection system is free of any obstruction.
4. The infrared curtain protective system shall provide:

    a. Protective field not less than 71" above the sill.
    b. Where a horizontal infrared light beam system is used:

        1) A minimum of 47 light beams.
        2) Accurately positioned infrared lights to conform to the requirements of the applicable handicapped code.

    c. Modular design to permit on board test operation and replacement of all circuit boards without removing the complete unit.
    d. Controls to shut down the elevator when the unit fails to operate properly.

2.10 FINISH AND MATERIALS

A. Hoistway Entrances Finish and Design

1. Hoistway entrances and door panels shall be finished in stainless steel w/No. 4 vertical grained finish as specified by the Owner.
2. Where no finish is specified, finishes shall be baked enamel primer gray.
3. Refer to specifications for other design requirements.

B. Car Interior Finishes

1. Car interior finishes shall be as selected by Owner and/or Architect.
2. Contractor shall provide samples of finishes as required for approval prior to fabrication.
3. Refer to specifications for other design requirements.
4. Special attention shall be given to flooring materials and suitability for intended duty.

C. Material, Finishes and Painting

1. General

a. Cold-rolled Sheet Steel Sections: ASTM A366, commercial steel, Type B
b. Rolled Steel Floor Plate: ASTM A786
c. Steel Supports and Reinforcement: ASTM A36
d. Aluminum-alloy Rolled Tread Plate: ASTM B632
e. Aluminum Plate: ASTM B209
f. Stainless Steel: ASTM A167 Type 302, 304 or 316
g. Stainless Steel Bars and Shapes: ASTM A276
h. Stainless Steel Tubes: ASTM A269
i. Aluminum Extrusions: ASTM B221
j. Nickel Silver Extrusions: ASTM B155
k. Bronze Sheet: ASTM B36(36M) alloy UNS No. C2800 (Muntz Metal)
l. Structural Tubing: ASTM A500
m. Bolts, Nuts and Washers: ASTM A325 and A490
n. Laminated / Safety Tempered Glass: ANSI Z97.1

2. Finishes

a. Stainless Steel

1) Satin Finish: No. 4 satin, long grain
2) Mirror Finish: No. 8 non-directional mirror polished

b. Sheet Steel:

1) Shop Prime: Factory-applied baked on coat of mineral filler and primer
2) Finish Paint: Two (2) coats of low sheen baked enamel, color as selected by the Architect.
3) Steel Equipment: Two (2) coats of manufacturer's standard rust-inhibiting paint to exposed ferrous metal surfaces in both the hoistway and pit that do not have galvanized, anodized, baked enamel, or special architectural finishes.

3. Painting

a. Apply two (2) coats of paint to the machine room floor.
b. Identify all equipment including buffers, crosshead, safety plank, machine, controller, drive, governor, disconnect switch, etc., by 4" high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
c. Paint or provide decal-type floor designation not less than six (6) inches high on hoistway doors (hoistway side), fascias and/or walls as required by A17.1 Rule 100.7 at intervals not exceeding 7'-0". The color of paint used shall contrast with the color of the surface to which it is applied.

2.11 FIXTURES / SIGNAL EQUIPMENT

A. General - Design and Finish

1. The design and location of the hall and car operating and signaling fixtures shall comply with the ADAAG.
2. The operating fixtures shall be selected from the manufacturer's premium line of fixtures.
3. Custom designed operating and signaling fixtures shall be as shown on the drawings or as approved by the Owner / Architect.
4. The layout of the fixtures including all associated signage and engraving shall be as approved by the Owner / Architect.
5. Where no special design is shown on the drawings, the buttons shall be as follows:

    a. Provide round solid milk white button with collar and LED call registered light as selected by the Owner / Architect from the manufacturer's premium line of push buttons.

6. Where no special design is shown on the drawings, the faceplates shall be as follows:

    a. Passenger Elevators

        1) Typical Floors: 1/8" thick stainless steel faceplate with No. 4 finish.

7. Mount passenger elevator fixtures with tamperproof fasteners. The screw and key switch cylinder finishes shall match faceplate finish.
8. Where key-operated switch and or key operated cylinder locks are furnished in conjunction with any component of the installation, four keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.
9. All caution signs, pictographs, code mandated instructions and directives shall be engraved and filled with epoxy.

B. Main Car Operating Panel

1. Provide a main car operating push button panel on the inside front return panel of the car.
2. Car operating panel shall be flush mounted with swing type, one-piece faceplate with heavy-duty concealed hinges.

    a. Mount all key switches that are required to operate and maintain the elevators exposed on the car station except those specified within a locked service cabinet.

3. The push buttons shall become individually illuminated as they are pressed and shall extinguish as the calls are answered.
4. The operating panel shall include:

    a. A call button for each floor served, located not more than 48" above the cab floor.
    b. "Door open" / "Door close" buttons.
    c. "Alarm" button, interfaced with emergency alarm. The alarm button shall

illuminate when pressed.

d. "Emergency Stop" switch per local law located at 35" above the cab floor.

e. Self-dialing, hands-free telephone with call acknowledging feature and A.D.A. design provisions.

5. Locked Firemen's Service cabinet, keyed in accordance with local Code, containing required devices and signals in accordance with ASME A17.1 Standards.

   a. Automatic opening of the locked cabinet door may be provided with signals initiated by the fire detection and alarm system where approved by the Authority Having Jurisdiction.

6. Provide a locked service cabinet flush mounted and containing the key switches required to operate and maintain the elevator, including, but not limited to:

   a. Independent/Attendant service switch with associated operating buttons and signal indicators.
   b. Light switch.
   c. Fan switch.
   d. G. F. I. duplex receptacle.
   e. Emergency light test button and indicator.
   f. Inspection Service Operation key switch.
   g. Port for hand-held service tool where applicable.
   h. Dimmer for cab interior lighting.

7. Car operating panel shall incorporate:

   a. An integral (no separate faceplate) digital L.E.D. floor position indicator
   b. Emergency light fixture (without a separate faceplate) and black-filled engraved unit I.D. number or other nomenclature, as approved by Owner
   c. A "No Smoking" advisory and the rated passenger load capacity.

8. Equip the car operating panel with security car call keyed switches OR proximity card reader to disconnect the corresponding floor push button.

   a. Security system shall be overridden by Phase II Firefighter's Emergency Operations in accordance with code.

9. Post Inspection Certificate behind an opening in the car operating panel that is fitted with a flush-mounted clear Plexiglas without a frame.

C. Car Direction Lantern

1. Provide a car riding lantern with visual and audible signal in the edge of the strike and return post.
2. The lens shall project a minimum of 1/4" and shall be of solid Plexiglas.
3. Use tamperproof screws with surface mount faceplate. Car lantern shall indicate the direction of travel when doors are 3/4 open.
4. The unit shall sound once for the "up" direction and twice for the "down" direction.

a. Provide an electronic chime with adjustable sound volume.

D. Voice Annunciator

1. Provide a voice annunciator in each elevator.
2. Coordinate size, shape and design with Designer and other trades.
3. The system shall include, but not limited to:

   a. Solid state digital speech annunciator
   b. A recording feature for customized messages
   c. Playback option
   d. Built-in voice amplifier
   e. Master volume control
   f. Audible indication for selected floor, floor status or position, direction of travel, floor stop and nudging.

4. Locate all associated equipment in a single, clearly labeled enclosure located either in the machine room and/or on car top.

E. Corridor Push Button Stations / Riser

1. A riser of push button signal fixtures shall be provided on all floors.
2. Each signal fixture shall consist of the following:

   a. A flush-mounted faceplate.
   b. Illuminating tamper-resistant push buttons measuring 3/4" at their smallest dimension as selected by the Owner.
   c. A recessed mounting box, electrical conduit and wiring.

3. Intermediate landings shall be provided with fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button.
4. Include firefighter key switch in the main lobby level station or other designated recall landing.
5. Push button signal fixtures shall be installed at a centerline height of 42" above the floor and shall be installed both plumb and flush to the finished wall.

   a. Standardize the final distance on all floors.

6. Fixture faceplates shall be installed adjacent to the entrance frame on front wall.

F. Floor Position Indicator

1. Provide a digital LED type floor position indicator at the main lobby only.
2. Indicator shall include 2" high numerals with integral direction arrows that will indicate the direction in which the elevator is traveling.
3. Indicator shall be located directly above the hoistway entrance frames.

G. Hoistway Access Switch

1. Install a cylindrical type keyed switch at top terminal in order to permit the car to be

moved at slow speed with the doors open to allow authorized persons to obtain access to the top of the car.

2. Where there is no separate pit access door, a similar switch shall be installed at the lowest landing in order to permit the car to be moved away from the landing with the doors open in order to gain access to the pit.
3. For simplex installations, locate the switch in the hall call push button station at the top and bottom terminal landings where required if allowed by the Authority Having Jurisdiction.
4. This switch is to be of the continuous pressure spring-return type and shall be operated by a cylinder type lock having not less than a five (5) pin or five (5) disc combination with the key removable only in the "OFF" position.

    a. The lock shall not be operable by any key which operates locks or devices used for other purposes in the building and shall be available to and used only by inspectors, maintenance men and repairmen in accordance with A17.1 applicable Security Group.

2.12 CAR ENCLOSURES

A. New Elevator Cab Allowance ($25,000 total net allowance per passenger elevator)

1. It is understood that if the selected manufacturer of the cab is not the same as the Elevator Supplier, all cab material will be constructed in a manner to accommodate the elevator manufacturer's associated equipment, such as operator, hangers, interlocks, etc., as purchased by the Owner or Owner's Agent.
2. The net allowance for the elevator cabs are to be exclusive of:

    a. Handling charges.
    b. Applicable sales and/or use taxes.
    c. Car door hangers, interlocks, exit contact locks.
    d. Platform, flooring, car door sill.
    e. Car installation, operating equipment, and such items are to be included by the Elevator Supplier in the base contract.

3. The net allowance covering the elevator cars of a design and material as selected shall include:

    a. Ventilation and lighting.
    b. Doors.
    c. Base wainscoting.
    d. Handrails.
    e. Entrance columns.
    f. Transoms as required.
    g. Necessary cutouts.
    h. All necessary cutouts and cab associated appurtenances that may be designed or required.

4. The Owner or Owner's authorized representative reserves the right to deduct the net allowances from the Elevator Contract and to purchase the elevator cabs separately.

5. The Owner retains the right to assign this purchase to the Elevator Supplier for coordination and receive the necessary credits or make the installation by an authorized representative of the Architect and/or Owner.

2.13 EMERGENCY LIGHTING / COMMUNICATIONS / SIGNALING

A. Battery Back Up Emergency Lighting Fixture and Alarm

1. Provide a self-powered emergency light unit.

   a. The light fixture shall contain a minimum of two (2) LED lamps. Flush mount the light fixture in the main car station. The fixture shall have a milk white lens.

2. Provide a car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.

   a. The battery shall be rechargeable nickel cadmium with a 10-year minimum life expectancy. Mount the power pack on the top of the car.
   b. Provide a 6" diameter alarm bell mounted directly to the battery/charger unit and connected to sound when any alarm push button or stop switch in the car enclosure is operated.
   c. The bell shall be configured to operate from power supplied by the building emergency power generator. The bell shall produce a sound output of between 80-90 dBa (measured from a distance of 10') mounted on top of the elevator car.

      1) Activation of this bell shall be controlled by the stop switch and alarm button in the car operating station
      2) The alarm button shall illuminate when pressed.

3. Where required by Code for the specific application, the unit shall provide mechanical ventilation for at least one (1) hour.
4. The operation shall be completely automatic upon failure of normal power supply.
5. Unit shall be connected to normal power supply for car lights and arranged to be energized at all times so it automatically recharges battery after use.

B. Emergency Voice Communication / Telephone

1. A hands-free emergency voice communication system shall be furnished in each car mounted as an integral part of the car operating panel.

   a. Necessary wires shall be included in the car traveling cable and shall consist of a minimum of one shielded pair of 20AWG conductors.
   b. 120V power shall be provided to power the hands-free device.

2. The telephone shall be equipped with an auto-dialer and illuminating indicator which shall illuminate when a call has been placed and begin to flash when the call has been answered.

a. Engraving shall be provided next to the indicator which says “When lit help is on the way".

3. In addition to the standard “Alarm” button, a separate activation button shall be provided on the car operating panel to initiate the emergency telephone and place a call.

   a. The telephone must not shut off if the activating button is pushed more than once.
   b. The telephone shall transmit a pre-recorded location message only when requested by the operator and be provided with an adjustable call time which can be extended on demand by the operator.
   c. Once two-way communication has been established, voice prompts shall be provided which instruct the operator on how to activate these functions as well as alerting the operator when a call is being attempted from another elevator in the building.

4. The system shall be compatible with ring down equipment and PBX switchboards.
5. The system shall be capable of serving as the audio output for an external voice annunciation system.

   a. Conversation levels shall measure 60 dbA or higher and measure 10 dbA above ambient noise levels.
   b. Each device shall be provided with a self-diagnostic capability in order to automatically alert building personnel should an operational problem be detected.

6. The phone shall be able to:

   a. Receive incoming calls from any On-Site Rescue Station (when provided or required).
   b. Receive incoming calls from other off-site locations via the public telephone system.
   c. Acknowledge incoming calls and automatically establishing hands-free two way communications.

      1) If no On-Site Rescue Station is provided, each hands-free device shall have built in line consolidation which will allow up to 6 elevators to be called individually from outside the building over a single telephone line and up to 80 elevators if an On-Site Rescue Station is provided.

7. The emergency elevator communication system shall require a maximum of one telephone line.

   a. The system must provide line sharing capability to eliminate the need for a dedicated telephone line.
   b. The line sharing function must ensure that the emergency telephones always receive dialing priority even if the line is in use and that the emergency telephones can be called into from an off-site location.

8. The system shall provide its own four hour backup power supply in case of a loss of regular AC power.
9. The system must provide capability for building personnel to call into elevators and determine the charge state of any backup batteries provided for the emergency telephones.
10. Pushing the activation button in any of the elevator car stations will cause any on-site Rescue Station (where provided or required) or security telephone to ring.

    a. If the on-site call is not picked up within 30 seconds, the call will be automatically forwarded to a 24 hour off-site monitoring service.
    b. The arrangements and costs of the off-site monitoring and telephone line shall be by others.

11. All electrical work shall conform to Division 16 requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection

1. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
2. Examine surface and conditions to which this work is to be attached or applied and notify the Owner in writing if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
3. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Owner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
4. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 FIELD QUALITY CONTROL

A. Inspection and Testing

1. Upon completion of each work phase or individual elevator specified herein, the Contractor shall, at its own expense, arrange and assist with inspection and testing as may be required by the A.H.J. in order to secure a Certificate of Operation.

B. Substantial Completion

1. The work shall be deemed "Substantially Complete" for an individual unit or group of units when, in the opinion of the Consultant, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.

2. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
3. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
4. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed.

3.3 PROTECTION / CLEANING

A. Protection and Cleaning

1. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
2. Upon completion, remove protection from finished surfaces and thoroughly clean and polish surfaces with due regard to the type of material. Work shall be free from discoloration, scratches, dents and other surface defects.
3. The finished installation shall be free of defects.
4. Before final completion and acceptance, repair and/or replace defective work, to the satisfaction of the Owner, at no additional cost.
5. Remove tools, equipment and surplus materials from the site.

B. Barricades and Hoistway Screening

1. The Contractor shall provide barricades where necessary in order to maintain adequate protection of areas in which work specified by the Contract Documents is being performed, including open hoistway entrances. Fabrication and erection as all barricades shall be in compliance with applicable OSHA regulations.
2. As required, the Contractor shall provide temporary wire mesh screening in the hoistway and of any elevator undergoing work specified in the Contract Documents. This screening shall be installed in such a manner as to completely segregate the hoistway from that of adjacent elevators. Screening shall be constructed from .041" diameter wire in a pattern that rejects passage of a 1" diameter ball.

3.4 DEMONSTRATION

A. Performance and Operating Requirements

1. Passenger elevators shall be adjusted to meet the following performance requirements:

   a. Speed: within 3% of rated speed under any loading condition.
   b. Leveling: within 1/4" under any loading condition.

c. Typical Floor-to-Floor Time: (Recorded from the doors start to close on one floor until they are 3/4 open at the next floor.)

Group Passenger Elevators	12.1 – 13.9 seconds.

d. Door Operating Times

Door Type	Opening	Closing
Only - 3'-6" Single speed side opening	2.2 – 2.6 sec.	4.5 – 5.3 sec.

e. Door dwell time for hall calls: 4.0 sec
f. Door dwell time for car calls: 3.0 seconds
g. Reduced non-interference dwell time: 1.0 seconds.

2. Maintain the following ride quality requirements for the passenger elevators:

a. Where pit permits, extend bottom roller guides by not less than one half the distance from the centerline of the upper roller guides to the platform.
b. Noise levels inside the car shall not exceed the following:

1) Car at rest with doors closed and fan off - 40 dba.
2) Car at rest with doors closed, fan running - 55 dba.
3) Car running at high speed, fan off - 50 dba.
4) Door in operation - 60 dba.

c. Amplitude of acceleration and deceleration shall not exceed 4.0 ft/sec^2.
d. A sustained jerk shall not be more than twice the acceleration.
e. The rate of change in the acceleration/deceleration rate shall not be greater than 8.0 ft/sec^3.

B. Acceptance Testing

1. Comply with the requirements of Division 01.
2. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
3. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.
4. The Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the unit under load conditions that vary from empty to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:

a. Operation of safety devices.
b. Sustained high-speed velocity of the elevator in either direction of travel.
c. Brake-to-brake running time and floor-to-floor time between adjacent floors.

d. Floor leveling accuracy.
e. Door opening/closing and dwell times.
f. Ride quality inside the elevator car.
g. Communication system.
h. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.

5. Upon completion of work specified in the Contract Documents on the last car in any group of elevators, and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of group dispatch/supervisory control features in the presence of the Consultant.
6. The Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:

   a. The back-up operating mode for group dispatch failure
   b. Simulated and actual emergency power operation
   c. Firefighter, attendant and independent service operations
   d. Restricted access security features and card reader controls
   e. Zoning operations and floor parking assignments
   f. Up/down peak operation

7. After hour tests of systems such as emergency generators, fire service, and security systems shall be conducted at no extra cost to the Owner.

END OF SPECIFICATION

SECTION 15000 SUPPLEMENTAL GENERAL CONDITIONS (APPLICABLE TO MECHANICAL, PLUMBING, FIRE SUPPRESSION, AND ELECTRICAL WORK)

1.01 GENERAL REQUIREMENTS

A. Refer to Divisions 15 and 16 – in their entirety for additional requirements pertaining to Mechanical, Plumbing, Fire Suppression, and Electrical work.

B. This section applies to the Mechanical, Plumbing, Fire Suppression, and Electrical work, and is complementary to the General Conditions of the Contract, the Contract Drawings, and all other Sections of the Technical Specifications.

C. The words “Mechanical”, Heating Ventilating & Air conditioning, and HVAC are used interchangeably herein, and on the contract drawings.

D. The words “automatic sprinkler system”, “sprinkler system”, “fire protection system ” and “fire suppression system” are used interchangeably, herein, and on the contract drawings.

E. Each respective Contractor - for the Mechanical, Plumbing, Fire Suppression, and Electrical work - shall provide all operations and services required for complete installation of the respective discipline, as specified herein, and as indicated on the respective contract drawings – including, all labor, materials, tools, equipment, hangers, supports, shipping, handling, rigging, testing, fees, and permits.

F. Each respective Mechanical, Plumbing, Fire Suppression, and Electrical Contractor shall provide all work described herein, indicated on the respective drawings, or that may be reasonably implied as incidental to the work of the respective trade.

G. The scope of the Mechanical Plumbing, Fire Suppression and Electrical work includes - start up, testing, adjusting, and balancing in order to insure that all the respective systems are safe, operable, and reliable - and are ready for use by the Owner.

1.02 SUMMARY OF WORK

A. The following lists are a brief summary. Refer to the Project Manual, Contract Drawings and the complete Technical Specifications for additional requirements.

B. The following paragraphs apply to MECHANICAL, PLUMBING, FIRE SUPPRESSION, AND ELECTRICAL WORK

1. DEMOLITION OF EXISTING UTILITIES

a. It is anticipated that the building shall be vacated during construction.

b. Once the building is vacant and has been officially turned over to the General Contractor for construction; the respective installing contractor for each discipline; Mechanical, Plumbing, Fire Suppression, and Electrical -, shall coordinate with authorized representatives of the Owner and the General Contractor (GC) regarding decommissioning the following existing systems:

i. Low Pressure Steam (LPS) Space Heating System,

ii. Plumbing Systems including sanitary, waste, vent domestic hot and cold water piping, and Storm Water piping,

iii. Fire Standpipe

iv. Electrical Power and Lighting.

c. The work includes; coordinating with authorized representatives of the Owner to schedule the interruption of live services, cutting capping and securing of existing piping, shutting each respective live service, draining the system(s), and the safe and proper disposal of waste water and debris.

d. Once all the existing systems - listed above - have been decommissioned and made safe for the start of demolition and construction work, the respective installing contractor shall notify the GC and the authorized representatives of the Owner - accordingly.

e. The scope of the work includes removing all visible and readily accessible exposed parts of the existing decommissioned systems including:

i. Low Pressure Steam (LPS) Space Heating piping,

ii. Plumbing sanitary, waste, vent domestic hot and cold water piping, and Storm water piping,

iii. Fire Standpipe piping,

iv. Electrical wiring, conduit, devices and lighting.

f. It is anticipated that, where existing utilities are concealed by permanent building walls, floors, or other permanent building components, such existing utilities shall be abandoned in place.

2. HISTORIC BUILDING – RESTRICTIONS ON THE LOCATION OF NEW UTILITIES IN THE LOBBIES AND MAIN STAIR

a. The New London City Hall Building is a Historic structure and certain spaces have architectural features warranting protection and preservation. The First, Second & Third Floor Lobbies and Monumental Main Stairway which is open to all three floor Lobbies have been so designated.

b. In light of the above the routing of all new utilities shall be restricted and the impact of exposed new piping, conduit and wiring on aesthetics shall be minimized in the above mentioned Lobbies and Monumental Open Main Stairway.

c. Accordingly the location of all new utilities slated for installation in the Lobbies and Main Open Stair shall be subject to prior review and approval by the Architect and other authorized representatives of the Owner.

3. RESTRICTED ACCESS TO BASMENNT & ATTIC

a. The contractors shall note that access to the Basement and Attic is extremely limited. Each respective contractor shall be solely responsible

for all work associated with gaining access into the Basement and Attic for the installation of all new equipment and materials for which he is responsible.

b. Provisions shall be made, by each respective installing contractor, for all equipment slated to be installed in the Basement and Attic to be shipped “knocked down” into basic components in order to facilitate delivery, placement and installation.

c. In addition, the scope of the work includes cutting, patching and restoration of all building components impacted by the work; including the modification and restoration of the Attic main roof, roofing supporting structural elements, and Basement foundation walls, hatches and any other structural elements related to gaining access to the Attic & Basement for installation of the work.

d. The scope of the work includes engaging a structural engineer licensed in the State of Connecticut - as required - to prepare drawings detailing the means proposed by the respective installing contractor to gain access to the Basement and Attic for installation of the work, together with associated restorations.

e. All documents prepared in this connection; shall bear the signature and stamp of the engineer under whose direction said documents were prepared; and shall be submitted to the Architect for review prior to proceeding with any structural modifications.

C. The following paragraphs apply to MECHANICAL WORK

1. Demolition.

2. The scope of the work includes converting the existing oil fired low pressure steam (LPS) boiler, currently used for space heating, to a natural gas fired unit capable of generating Hot Water also to be used for space heating. Refer to the drawings for additional work related to the existing boiler.

3. Providing a new stainless steel flue running from the existing boiler to the existing masonry chimney.

4. New, fresh air, exhaust, and heating, ventilation and air conditioning equipment.

5. New hot water supply and return piping.

6. New chilled water supply and return piping.

7. New terminal heating and cooling equipment.

8. New Microprocessor Based DDC Electronic Automatic Temperature Controls.

9. New automatic controls and signal wiring.

10. Coordination with other trades including site work and trench excavation and backfilling.

11. Concrete housekeeping pads.

12. Transportation, shipping, handling, and rigging.

13. Proper handling transport and disposal of waste water and debris.

14. Thermal and acoustic insulation for piping, equipment, and ductwork.

15. Testing, adjusting, balancing, start-up, and commissioning, all new equipment - including providing the services of factory trained technician(s).

16. Instructing, demonstration, and training - of Owner designated facility-operating personnel – in the use of all new equipment.

D. The following paragraphs apply to PLUMBING WORK

1. Demolition.

2. Temporary water

3. Complete new plumbing systems.

4. New plumbing fixtures, equipment, and trim.

5. New electric domestic hot water heaters

6. New domestic water, sanitary, waste, and vent piping.

7. Natural gas service, aboveground and underground distribution piping and connections to existing and new equipment.

8. Coordination with the trench excavation and backfilling contractor.

9. Concrete housekeeping pads.

10. Transportation, shipping, handling, and rigging.

11. Testing, adjusting, balancing, start-up, and preparation of written reports.

12. Thermal insulation for piping, and equipment.

13. Testing, adjusting, balancing, start-up, and commissioning, all new equipment - including providing the services of factory trained technician(s).

14. Instructing, demonstration, and training - of Owner designated facility-operating personnel – in the use of all new equipment.

E. The following paragraphs apply to FIRE SUPPRESSION WORK

1. Demolition

2. Installation of new automatic sprinkler systems to serve the Lobbies, Main Open Stair and the City Clerk Vault. .

3. Installation of all piping related to the automatic sprinkler system. The automatic sprinkler contractor shall furnish and install all aboveground fire suppression piping, sprinklers and devices.

4. Installation of all signal wiring and conduit required for the automatic sprinkler system.

5. Concrete pads.

6. Rigging.

7. Providing for the complete testing and certified reporting of all tests of the sprinkler system.

8. Engineering and design of a complete fire suppression systems, including preparation of detailed hydraulic calculations, detailed working drawings, as required by NFPA 13 “Standard for the Installation of Sprinkler Systems”.

9. Refer to Division 15 in its entirety and Section 15310 “Fire Suppression” in particular - for additional requirements.

F. The following paragraphs apply to ELECTRICAL WORK

1. Refer to Division 16 for additional requirements.
2. Demolition.
3. Providing conduit, wire, distribution panels, transformers, surge/lighting suppression, grounding, and feeders for power and lighting.
4. Secondary electrical utility service work as indicated on the drawings.
5. Providing for secondary service from an existing Utility Company manhole into the service entrance section of the switchboard.
6. Providing site, night, emergency and exit lighting.
7. Providing spare conduits, junction boxes, box sleeves and conduit sleeves from the interior to the exterior of the building.
8. Providing common grounding of all equipment.
9. Providing a new building fire alarm system.
10. Providing power wiring for all temperature/control panels and equipment. Allow for twenty (20) circuits each 75’, each 20A, 120V. Control wiring is by others, coordinate with Div. 15.
11. Providing power feed to new elevator.
12. Providing for the installation of motor starters, and the installation of variable speed drives. Motor starters and variable speed drives will be provided by Div. 15
13. Temporary light and power.
14. Fireproofing of all conduit/electrical penetrations.
15. Providing wiring consistent with a non-return air ceiling, plenum use.
16. Providing for the waterproofing of all conduit entrances into the building.
17. Removal and proper disposal of electrical debris as required to complete the project.
18. Providing for all of the wiring and electrical devices.

19. Providing all necessary equipment for the execution of the electrical work.

20. Coordination with the trench excavation and backfilling contractor.

21. Concrete housekeeping pads.

22. Providing for all rigging as required for the work effort.

23. Instructing, demonstration, and training - of Owner designated facility-operating personnel – in the use of all new equipment.

24. Testing, adjusting, start-up, and commissioning, all new equipment - including providing the services of factory trained technician(s).

25. Providing for data links and testing, certification of said links.

1.03 ADDITIONAL REQUIREMENTS OF THE WORK

A. The General Contractor shall provide Trench excavation and backfilling for Mechanical, Plumbing and Electrical work. Coordinate with the General Contractor, as required, to facilitate the work.

B. Submittals: Prior to proceeding with installation - submit for the approval of the Architect / Engineer, six copies of Shop Drawings and complete Technical Data describing all Products, and obtain approval.

C. The scope of the project includes demolition work. The mechanical, electrical, and plumbing contractors will be required to cut, cap and secure, in accordance with applicable building codes, any and all utilities within his respective discipline in order to accommodate the installation of the new work shown on the construction documents. The contractors must take into account the demolition work shown on the Architectural, Structural, HVAC, Plumbing, and Electrical drawings. All existing utilities and demolition work are not shown on the drawings. The contractors are responsible to field survey the existing building to determine the full extent of the demolition work required in his respective trade.

D. Supervision and coordination with the Owner’s representatives and other trades.

E. Preparation and submission of shop drawings and catalog cuts for approval.

F. Cutting, patching, painting, and restoration of certain existing building components, surfaces, paved roadways and walkways.

G. Fire stopping methods and materials.

H. Hangers, supports, anchors and guides.

I. Design and installation of sway bracing, foundations, supports, and lateral force restraints for piping, ductwork and equipment per code.

J. Sleeves, escutcheons and access doors.

K. Pumps and motors.

L. Identification of components.

M. Vibration isolation and seismic restraints.

N. Piping, equipment and ductwork insulation.

O. Hydronic piping, specialties and equipment.

P. Piping, specialties and equipment.

Q. Plumbing piping, specialties, fixtures and equipment.

R. Ductwork and ductwork accessories.

S. Air outlets and inlets and louvers.

T. Pumps.

U. Instrumentation.

V. Warning tapes for all underground utilities.

W. Connection to services provided by others, and to existing services.

X. Perform commissioning of systems, in accordance with latest edition of ASHRAE Guidelines.

Y. Perform all work in accordance with the guidelines set forth in ASHRAE Guideline publication entitled "Indoor Air Quality Guidelines for Occupied Buildings Under-Construction."

Z. Provide for the Start-up, testing, adjusting and balancing on all systems provided, prior to turning them over to the Owner.

AA. All work shall be fabricated and installed in the most workmanlike, durable and watertight manner that experienced and skilled workman can be reasonably expected to produce.

BB. Each respective Contractor shall be responsible for furnishing and payment of all legal notices, certificates, permits and fees necessary for installation and inspection of the work under his respective Contract (Division 15 or 16). This includes payment of all utility company charges associated with the work.

CC. Each respective contractor shall be licensed to perform the work within his trade, including, but not limited to welders, plumbers, pipe fitters, HVAC installers, electricians, excavators, testing laboratories and riggers. Proof of license shall be provided prior to the start of work.

DD. Six copies of shop drawings for all equipment and materials shall be submitted to, and approved by the Engineer before fabrication and installation of the work. Certified performance data shall be furnished for all equipment.

EE. The contractors shall prepare large scale coordination drawings to organize the installation of products/work for efficient use of available space, for proper sequence of installation and to identify potential conflicts. Drawings shall be coordinated between all trades.

FF. The mechanical contractor must prepare large scale shop drawings which fully detail sheet metal ductwork or other components of his work, before proceeding with fabrication.

GG. Except as otherwise indicated, all piping, ducts, equipment, conduits and controls, or other devices in any way related to the work, must be securely concealed, totally and completely by the respective installing Contractor. Exposed piping and wiring shall not be permitted, unless so indicated specifically.

HH. The mechanical contractor shall have the option of providing equipment controls directly from the equipment manufacturer or providing them from the automatic

temperature controls contractor for mounting by the equipment manufacturer. In either case, the mechanical contractor shall be solely responsible for achieving the sequence of controls and remote sensing, indicating, alarm and control functions shown on the contract drawings.

II. All wiring installed above suspended ceilings must be rated for use in return air plenum ceilings.

JJ. All lighting fixtures installed/reinstalled (new or existing) shall be installed with secondary supports.

KK. The electrical contractor is responsible to furnish duct smoke detectors, for installation by the mechanical contractor. The electrical contractor shall furnish and install all related wiring for duct smoke detectors, between the duct smoke detector and the Fire Alarm Control Panel.

LL. The mechanical contractor is responsible to furnish and install smoke/fire dampers. The electrical contractor shall furnish and install all related wiring for smoke/fire dampers.

MM. The mechanical contractor shall supply electrical starters for all mechanical equipment. Starters shall meet the requirements of Division 16. Starters shall be installed by the electrical contractor.

NN. The plumbing contractor shall supply electrical starters for all plumbing equipment. Starters shall meet the requirements of Division 16. Starters shall be installed by the electrical contractor.

OO. All fans shall be provided with electrical disconnect switches. Disconnect switches shall be supplied by the mechanical contractor. Disconnect switches shall meet the requirements of Division 16. Disconnect switches shall be installed by the electrical contractor.

PP. All motors shall meet or exceed ASHRAE/IES 90.1-2001 premium efficiency energy requirements and local utility company premium efficiency requirements. All motors shall be non-overloading over their entire curve.

QQ. All fans shall be provided with adjustable pulleys.

RR. Cutting and patching of building components, disturbed by the work, shall be performed by each respective contractor. Finish elements, exposed to view, shall be subject to the review and approval of the Architect.

SS. Any wall, floor and/or ceiling penetration shall be sealed following installation to ensure that the effectiveness of the wall, floor or ceiling and its fire rating is maintained.

TT. All piping, accessories, specialties, fixtures and/or equipment related to potable drinking water shall meet applicable Federal, State and Local codes, standards, regulations and requirements pertaining to safe drinking water, including the standards of the Safe Drinking Water Act, Lead Contamination Control Act, and National Sanitation Foundation, latest editions.

UU. Flexible duct connections shall be permitted only where indicated on the drawings.

VV. All access doors required for proper access to concealed work and equipment shall be furnished and installed by each respective contractor. Ratings for all

access doors shall be consistent with the rating of respective construction pierced by the access door.

WW. The manufacturers and installing contractors shall certify in writing that all systems/equipment and operating and safety controls have been tested and are operating properly prior to asking the Owner to accept or operate any systems/equipment and/or controls.

1.04 BID ALTERNATES

The Contractor is requested to prepare Bid Alternate Prices as described on the "Bid Form".

1.05 CODES, STANDARDS, GUIDES, RECCOMMENDED PRACTICES, AND SPECIFICATIONS

A. Regulatory Requirements

All work performed under the Contract documents shall be in strict conformance with the requirements of the following:

1. State Building Code/2005 Connecticut Supplement.
2. International Building Code/2003.
3. International Existing Building Code/2003.
4. International Mechanical Code/2003.
5. International Plumbing Code/2003.
6. International Energy Conservation Code/2003.
7. National Electric Code NFPA 70-2005.
8. Connecticut Fire Safety Code/2005.
9. ICC/ANSI A117.1-Accessible and Usable Buildings and Facilities/2003.
10. NFPA 101-2003.
11. OSHA 29 CFR Part 1910 Occupational Safety and Health Regulations/1999.
12. OSHA 29 CFR Part 1926 Occupational Safety and Health Regulations for Construction/1999.
13. Life Safety Code – NFPA 101.
14. NFPA 70 – National Electrical Code of the National Fire Protection Association, Inc.
15. NFPA References.
16. NFPA 13 Standard for the Installation of Sprinkler Systems
17. The guidelines set for in the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Publication "Indoor Air Quality Guidelines for Occupied Buildings Under Construction."
18. The guidelines set forth in the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Guideline 1 Publication "The HVAC Commissioning Process."

B. Accepted Standards

All work performed under the Contract Documents shall be in accordance with the following accepted standards. Omission of a particular standard from this list does not constitute non-acceptance or disapproval.

1. Air Movement and Control Association (AMCA).
2. Air Conditioning and Refrigeration Institute (ARI).
3. American National Standards Institute, Inc. (ANSI).

4. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE).
5. American Society of Mechanical Engineers (ASME).
6. American Society for Testing and Materials (ASTM).
7. American Standards Association (ASA).
8. American Welding Society (AWS).
9. Associated Air Balance Council (AABC).
10. Factory Mutual Engineering Corporation (FM).
11. American Water Works Association (AWWA).
12. Cast Iron Soil Pipe Institute (CISPI).
13. Factory Mutual Engineering Corporation (FM).
14. Institute of Electrical and Electronic Engineers (IEEE).
15. National Electrical Manufacturer's Association (NEMA).
16. National Fire Protection Association (NFPA).
17. National Association of Plumbing, Heating, Cooling Contractors (NAPHCC).
18. Occupational Safety and Health Administration (OSHA).
19. Plumbing Drainage Institute (PDI).
20. National Sanitation Foundation (NSF).
21. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
22. State Building Construction Code Housing and Building Codes Bureau (SBCC).
23. Underwriters' Laboratories, Inc. (UL).
24. National Electrical Code (NEC).
25. National Electrical Safety Code.
26. Insulated Cable Engineers Association (ICEA).
27. Factory Insurance Association (FIA).
28. National Electrical Contractors Association (NECA).
29. Local Inspection Agency and Authority Having Jurisdiction.
30. Local Power Company and Local Telephone Company.
31. State Building Construction Code Housing and Building Codes Bureau (SBCC).

C. References

1. Regulatory requirements, codes, standards, guides, recommended practices, and standard specifications, included herein, refer to the editions current as of the bid date, include any addenda / errata, and shall be considered part of these specifications as if printed herein in their entirety.

2. For products specified by association or trade standards, comply with requirements of the standard, except when requirements that are more rigid are specified or required by applicable codes. When these standards are not named, they are implied in conjunction with the specified materials and methods.

D. If there is a conflict between any of the applicable regulatory requirements, codes, standards, guides and recommended practices listed above, the contractor shall conduct his work in accordance with the more stringent requirement.

E. If there is a conflict between these specifications and any of the regulatory requirements, codes, standards, guides, and recommended practices listed above,

the contractor shall inform the Engineer and conduct his work in accordance with the more stringent requirement.

1.06 EXAMINATION OF SITE

The Drawings do not show all existing conditions. Prior to submitting his bid - the Contractor is required to examine the site and familiarize himself with existing conditions to the extent that such existing conditions may influence his work. Failure to visit the site or properly account for existing conditions - will in no way - relive the Contractor of responsibility to complete the work without additional compensation.

1.07 INTENT OF THE DOCUMENTS

A. The drawings are diagrammatic. The run and arrangement of the work shall be approximately as indicated. All required offsets; fittings, materials, and/or other appurtenances required to avoid interference and fit the work into the space available, are not shown, and must be provided for a complete installation without additional cost.

B. Before starting work, the contractors shall examine all contract drawings, and report discrepancies to the Engineer in writing.

1.08 CONTRACTOR'S USE OF PREMISES

A. Confine operations, including storage of apparatus, equipment and materials, as directed by the Architect.

B. Parking for Contractor's employees will be limited to designated areas.

C. Debris shall be removed as produced, avoiding accumulation. Dumpsters shall be provided by each respective contractor, in a location subject to the approval of the Architect.

1.09 COORDINATION

A. The contractor(s) shall prepare large-scale coordination drawings to organize the installation of the work for efficient use of available space. Coordinate work with other trades. Provide adequate clearance as required for proper maintenance.

B. Coordinate with asbestos abatement work when required.

C. The drawings are diagrammatic. The run and arrangement of piping shall be approximately as indicated. All required offsets, fittings, materials, etc., to avoid interference and fit the work into the space available are not shown and must be provided for a complete installation without additional cost.

D. Record changes during the course of the installation and provide one set of as-built drawings for use by the Owner.

E. Coordination of Submittals - Review shop drawings, product data, and samples for compliance with contract documents and for coordination among work of all sections of the specifications.

1.10 CUTTING, PATCHING, PAINTING, RESTORATION OF SURFACES

A. All openings, chases and inserts are not be shown on the Drawings. It shall be the responsibility of each respective Contractor to provide all such chases, channels or openings where required for installation of his work.

B. Each respective Contractor shall furnish, properly locate and install all sleeves, inserts, and hangers required for the installation of his work.

C. Permission and positive instructions shall be sought and obtained before cutting any structural element, including; walls, beams, arches, lintels.

1.11 FIRESTOPPING

A. All systems shall be UL approved. All materials and workmanship shall be in strict accordance with the respective listing and the manufacturer's recommendations. Fireproofing and fire stopping shall be provided where new work pierces a building component - to maintain the integrity of the respective component - in accordance with: ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials. ASTM E119 – Method for Fire Tests of Building Construction and Materials. ASTM E814 – Test Method of Fire Tests of Through-Penetration Fire Stops.

B. Conform to applicable building codes for fire resistance ratings and surface burning characteristics, and locations requiring fire-stopping.

C. Submit fire-stopping materials to the Architect for approval.

1.12 ACCESS DOORS

A. Provide access doors for concealed equipment. Where rated building components are pierced – the rating of the access door shall be consistent with that of the building component as required by code. Access doors shall be installed per its respective Listing.

B. Access doors shall be installed in ducts at all fire dampers, control dampers and as indicated on the drawings.

1.13 SPECIAL PROJECT PROCEDURES

A. SCHEDULE – Not Used

B. PREPURCHASE – Not Used

C. Welding Operations

1. All welding shall be performed by a person/contractor licensed to perform welding at the job site location.

2. Safeguard the buildings and occupants from the potential hazards associated with welding and cutting operations. Obtain written permission from the Owner prior to performing any welding or cutting operations. Provide a suitable fire watch and adequate fire extinguishing equipment during his welding/cutting operations. Follow OSHA Regulations and the "Standard for Fire Prevention in Use of Cutting and Welding Processes", NFPA 51B, in connection with all welding and cutting processes.

D. Coordination with Asbestos Abatement

Notice: THE PREMISES MAY CONTAIN ASBESTOS

1. If the Contractor should encounter any material suspect or known to contain asbestos, he shall immediately notify the Architect.

2. The Contractors must not proceed with any work whatsoever related to existing facilities, until any required asbestos abatement has been

successfully completed. The Contractors may proceed with work only in areas, which have been certified safe and free of asbestos by competent authorities.

3. Asbestos abatement work shall be performed by others, under separate contract[s], which may run concurrently with this contract.

E. Lead Containing Material

Construction activities disturbing surfaces containing lead-based paint, which are likely to be employed, have been known to expose workers to levels of lead in excess of the Permissible Exposure Limit. Conduct demolition and removal work in conformance with Federal, State, and Local regulations. In addition, construction debris/waste may be classified as hazardous waste. Disposal of hazardous waste shall be in accordance with applicable regulations.

1.14 SALVAGEABLE MATERIALS

Any material deemed by the Owner to have salvageable value shall remain the property of the Owner. The Contractors shall remove such equipment and deliver it to the Owner at a mutually agreed time and location.

1.15 FIRE PROTECTION

Each Contractor, during construction, shall be responsible for loss or damage by fire to the work of his contract until completion. Any fire used within the structure for working purposes shall be extinguished when not in use. Bitumen or tar shall be melted on the ground only. No flammable material shall be stored in the structure or in close to the building at any time. Each Contractor shall assign a responsible employee to be in charge of fire protection measures.

1.16 PROTECTION

A. All buildings, equipment, furnishings, grounds, and plantings shall be protected from damage of every description, and any such damage thereto shall be repaired or otherwise made good at no expense to the Owner by each respective Contractor.

B. Each Contractor shall be held responsible for, and must make good at his own expense, any water damage or any other type of damage due to improper protective coverings.

C. Protect at all times the public and building personnel from injury.

D. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

E. Each Contractor shall provide protective coverings at walls, projections, jambs, sills, and soffits or openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

F. Each Contractor shall provide temporary partitions and ceilings to separate his work areas from Owner occupied areas to prevent penetration of dust and moisture into Owner occupied areas and equipment. Construction – erect framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces.

G. Excavations/trenches shall not be left open and/or unattended. Appropriate precautions shall be taken by the Contractor to safeguard building occupants and the public from the potential dangers of open excavations/trenches. Provide rigid steel roadway plates to temporarily safeguard excavations/trenches and insure unrestricted access to the building.

1.17 SECURITY

A. Each Contractor shall provide a security program and facilities to protect his work, existing facilities, and Owner's operations from unauthorized entry, vandalism and theft.

B. Each Contractor shall be solely responsible for damage, loss or liability due to theft or vandalism related to the work specified herein.

1.18 TRAFFIC WAYS

A. The Contractors may use on-site paved roads and parking areas in accordance with Owner's requirements, but shall not encumber same or their access. Public highways shall not be blocked by standing trucks, parked cars, material storage, construction operations, or in any other manner.

B. Public roads and existing paved roads, drives and parking areas on Owner's property shall be kept free from scrap, debris or other materials due to construction operations, and any damage to their surfaces caused by the Contractor shall be repaired by him at his own expense.

C. If the work of the contract affects public use of any street, road, highway or thoroughfare, the Contractor shall confer with the local police Authority Having Jurisdiction to determine if, and how many, police officers are needed for public safety, in addition to any barriers and signals that may be needed. The Contractor will be responsible for payment of any required police services.

1.19 TEMPORARY CONTROLS

A. Protect installed work. The Contractors shall consult and coordinate closely with the Owner concerning the specific requirements for control of dust, noise, odors, pests, rodents, and pollution related to demolition or construction.

B. Exterior Enclosures

Provide temporary insulated weather-tight closure of any exterior openings resulting from the work of this project. These temporary insulated weather-tight closures shall accommodate acceptable working conditions and protection for products; shall allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections; and shall prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

C. Interior Enclosures

1. Provide temporary partitions and ceilings required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

2. Construction: Framing and reinforced polyethylene, plywood or gypsum board sheet materials with closed joints and sealed edges at intersections

with existing surfaces; maximum flame spread rating of 75 in accordance with ASTM E84.

1.20 CONSTRUCTION CLEANING

A. Maintain areas under Contractor's control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces prior to closing the space.

C. Periodically clean interior areas prior to start of surface finishing, and continue cleaning on an as-needed basis.

D. Control cleaning operations so that dust and other particulates will not adhere to wet or newly coated surfaces.

E. Remove waste materials, debris and rubbish from site daily and dispose of legally off-site. No scrap/debris shall remain inside the building or anywhere on site upon final acceptance/completion of said project.

1.21 TRANSPORTATION AND HANDLING

A. All materials and equipment shall be so delivered, stored and handled as to prevent intrusion of foreign matter and any damage by weather or breakage. Packaged materials shall be delivered and stored in original, unbroken packages.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Packages, materials and equipment showing evidence of damage shall be rejected and replaced at no additional cost to the Owner.

1.22 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature, moisture, and humidity ranges required by manufacturers.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet coverings; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions. Keep log showing date, time and problem, if any.

E. All stone, masonry units, and similar material shall be stored on platforms or dry skids, and shall be adequately covered and protected against damage of any kind.

1.23 FINAL CLEANING

A. Clean surfaces; remove temporary labels, stains, and foreign substances. Replace filters of mechanical equipment systems.

B. Remove waste and surplus materials, rubbish, and construction equipment and facilities from the project and from the site. Deposit legally off-site.

1.24 PROJECT RECORD DOCUMENTS

A. Record Drawings During Construction

1. Each Contractor is to maintain two (2) sets of black (or blue) and white prints of the Contract Drawings at the project site, on which he will record changes as they occur on the job. Maintain the record sets separate and apart from documents used for construction.

2. Keep documents current; do not permanently conceal any work until required information has been recorded.

3. At the conclusion of construction, the Contractors shall turn one corrected set of the drawings over to the Architect/Engineer.

1.25 OPERATION AND MAINTENANCE DATA

A. The contractors shall orient and instruct the Owner's designated personnel in the operation of all new equipment and shall provide manuals, and if required, provide video tapes of the basic maintenance of the equipment for training purposes. Date and time of meeting shall be mutually agreed upon with Owner. Provide qualified personnel for as long as necessary to fully orient and instruct the Owner.

B. Each Contractor shall submit two copies of Operation and Maintenance Manuals in 3-ring loose-leaf notebooks to the Engineer for approval, with all additional information that the Engineer may request and considers necessary for the proper servicing and maintenance of all equipment. Manuals may consist of plain paper copies of approved shop drawings, catalog cuts and manufacturer's operating and maintenance instructions. The quality of the copies shall be subject to approval by the Engineer.

C. Required equipment warranties shall be submitted in four (4) copies to the Engineer.

1.26 WARRANTIES AND GUARANTEES

A. The Contractors shall guarantee all materials, equipment and workmanship for a period of one (1) year, minimum, from the date of acceptance of the work, except as otherwise listed below. Each contractor shall employ labor skilled and competent for the class of work to be performed during the guarantee period. Each contractor shall be responsible for, and make good, without expense to the Owner, any and all defects arising during the guarantee period.

B. Where manufacturer's standard warranties extend beyond the minimum one year period, the Contractors shall convey these extended warranties to the Owner, at no additional charge. Refer to individual specification sections for requirements regarding extended manufacturer's standard warranties.

C. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products.

D. When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure, or must be removed and replaced to provide access for correction of warranted construction.

E. When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated

warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

F. Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with the requirements of the Contract Documents. The contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

G. Provide certification that finish materials have all fire rated finishes required.

H. Provide certification that all applicable equipment meets UL rating for its intended use.

I. Submittals – Submit written warranties prior to the date certified for Substantial Completion.

1.27 SPARE PARTS

Provide spare parts as required in individual specification sections.

END OF SECTION 15000

SECTION 15140 - SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of supports, hangers and anchors for piping, ductwork and equipment. Refer to the drawings and related specification sections for additional requirements.

B. The Contractor shall design and provide; supports, anchors, and hangers in strict accordance with the Codes, Standards, Guides, and Recommended Practices listed herein.

C. Pipe and equipment hangers, supports, and associated anchors.

D. Equipment bases and supports.

E. Sleeves and seals.

F. Structural steel shapes, plates and bars.

G. Flashing and sealing equipment and pipe stack.

1.02 RELATED WORK

A. Concrete equipment bases.

B. Section 15242 - Vibration Isolation and Seismic Restraints.

C. Section 15250 – Mechanical Insulation.

D. Section 15410/30/50 – Plumbing Piping, Specialties, Fixtures and Equipment.

E. Section 15510/15 – Hydronic Piping, Specialties and Equipment.

F. Section 15535 – Refrigerant Piping.

G. Section 15835 – Terminal Heat Transfer Units.

H. Section 15870 – Exhaust, Ventilating and Return Fans.

I. Sections 15890/910 – Ductwork and Ductwork Accessories.

1.03 REFERENCES

A. ANSI/ASME B31.1 – Power Piping.

B. SMACNA Duct Construction Standards.

1.04 QUALITY ASSURANCE

A. Supports for Ductwork – in strict conformance with SMACNA recommendations and standards.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of the Contract Documents that apply to the work in this section.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Hanger for Pipe Sizes ½ to 1-1/2 Inch: malleable iron or carbon steel, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 to 4 Inches and cold Pipe Sizes 6 Inches and Over: Carbon steel, adjustable, clevis.

C. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.

E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hooks.

F. Wall support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over.

G. Vertical Support: Steel riser clamp.

H. Floor support for Pipe Sizes to 4 Inches and all Cold Water Pipe Sizes: cast iron adjustable pipe saddle, locknut nipple, floor flange and concrete pier or steel support.

I. Floor support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

J. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

K. Shield for Insulated Piping 2 Inches and Smaller: 18 gauge galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support; for any parts in contact with copper pipe or tubing, carbon steel copper plated.

L. Shields for Insulated Piping 2-1/2 Inches and Larger (Except cold Water Piping): Pipe covering protective saddles.

M. Shields for Insulated cold Water Piping 2-1/2 Inches and Larger: hard block non-conducting saddles in 90 degree segments, 12 inch minimum length, block thickness same as insulation thickness.

N. Shields for Vertical Copper Pipe Risers: Sheet lead.

2.02 HANGER RODS

A. Steel Hanger Rods: threaded both ends, threaded one end, or continuous thread.

2.03 INSERTS

A. Inserts: malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

A. Metal Flashing: 26 gauge galvanized steel.

B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

C. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.05 EQUIPMENT CURBS

A. Rooftop Equipment - Fabricated of steel; supplied by equipment manufacturer.

B. Fans and Gravity Ventilators- Pre-fabricated aluminum roof curbs, with fiberglass insulation liner firmly attached to the inside curb wall. The roof curb shall include an extended base, damper tray and pre-punched mounting holes. Access shall be provided for damper service and screen cleaning.

C. All roof curbs shall be designed specifically for use on type of roof where equipment is to be installed.

D. All roof curbs shall be minimum 18 inches high.

2.06 HOUSEKEEPING PADS

A. Reinforced concrete, 6 inches high, and extending minimum 3 inches beyond equipment in all directions, unless otherwise indicated.

B. Concrete and reinforcement shall meet ACI (American Concrete Institute) and ASTM standards.

C. Concrete compressive strength - 4000 psi at 28 days.

2.07 SLEEVES

A. Sleeves for Pipes Through Non-Fire Rated Floors: form with 18 gauge galvanized steel.

B. Sleeves for Pipes Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gauge galvanized steel.

C. Sleeves for Round Ductwork: Form with Type 304 stainless steel.

D. Sleeves for Rectangular Ductwork: Form with Type 304 stainless steel.

E. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

F. Fire Stopping Insulation: Glass fiber type, non-combustible, unless otherwise indicated.

G. Caulk: Acrylic non-combustible sealant, unless otherwise indicated.

2.08 MISCELLANEOUS METAL SUPPORTS

A. Structural steel shapes, plates and bars – ASTM A36.

2.09 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping, unless otherwise indicated.

B. Design hangers without disengagement of supported pipe.

C. Provide copper plated hangers and supports for copper piping.

2.10 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.01 DUCT HANGERS AND SUPPORTS

A. Support ductwork in strict accordance with applicable NFPA and SMACNA Standards and BOCA National Building Code, latest edition, which includes piping, ductwork and equipment sway bracing and lateral force restraints.

B. Refer to hanger and support details shown on the drawings for additional information concerning duct hangers and supports.

3.02 INSERTS

A. Provide inserts for placement in concrete formwork.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

3.03 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE (In Inches)	MAXIMUM SPACING	DIAMETER
½ TO 1-1/4	6’ – 6”	3/8”
1-½ TO 2	8’ – 0”	3/8”
2- ½ TO 3	9’ – 0”	1/2”
4 TO 6	14’ – 0”	7/8”
8	19’ – 0”	7/8”
10	20’ – 0”	7/8”
C.I. Bell & Spigot (or No-Hub) and at Joints	5’0”	7/8”

B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

G. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide rigid anchors for pipes after vibration isolation components are installed.

J. The Contractor shall provide thrust blocks at all changes in direction, changes in size, terminal or dead ends, and at all valves for underground piping.

K. Provide seismic supports/restraints in accordance with latest edition of BOCA code.

3.04 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of reinforced concrete and steel, unless otherwise indicated. Place concrete and reinforcements in accordance with ACI requirements.

B. Use accelerating and set retarding admixtures only with prior approval of the Engineer.

C. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

D. Construct supports of heavy steel members. Supports shall be rigid. Brace and fasten with flanges bolted to structure.

E. Verify that field conditions are acceptable and are ready to receive work.

F. Erect work square, level and accurate to sizes and free from distortion or defects detrimental to appearance and performance.

G. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

A. Provide flexible flashing and metal counter-flashing where piping penetrates weather or waterproofed walls, floors and roofs.

B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one-inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inch sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter flash and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device/flashing flange.

D. Seal floor, shower or mop sink drains watertight to adjacent materials.

E. Provide acoustical lead flashing around pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.

F. Provide curbs for mechanical roof installations. Refer to contract drawings for details. Flexible sheet flash and counter flash with sheet metal; seal watertight.

3.06 SLEEVES

A. Set sleeves in position in formwork, where applicable. Provide reinforcing around sleeves.

B. Extend sleeves through floors two inches above finished floor level. Caulk sleeves full depth and provide floor plates.

C. Where ductwork penetrates floor, ceiling or wall, close off space between duct and adjacent work with fire stopping insulation and caulk seal air tight in strict accordance with NFPA standards. Provide close fitting stainless steel collar covers at both sides of penetrations.

D. Where piping penetrates floors, ceiling or wall, close off space between pipe and adjacent work with fire stopping insulation and caulk seal airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration, unless otherwise indicated.

E. Install stainless steel escutcheons for pipe penetrations at finished surfaces.

END OF SECTION 15140

SECTION 15190 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of mechanical identification shown on the contract drawings or specified herein.

1.02 RELATED WORK

A. Painting: Identification.

1.03 SUBMITTALS

A. Submit product data under the provisions of the Contract documents that apply to the work in this section.

B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. W. H. Brady Company.

B. Seton Nameplate Company

C. John P. Nissen Jr. Company.

D. Substitutions: Under provisions of the Contract Documents that apply to the work of this section.

2.02 MATERIALS

A. Color: unless specified otherwise, conform to ANSI/ASME A13.1.

B. Plastic Nameplates: Laminated three-layer plastic with engraved red letters on white background color.

C. Plastic Tags: laminated three-layer plastic with engraved red letters on white background color. Tag size minimum 1-1/2 inch diameter.

D. Metal tags: 1-1/2 inch round with ½ inch high black filled numbers, to identify service and valve number; with brass hooks and jack chain.

E. Stencils: with clean cut symbols and letters of following size:

Main Branches and Risers

Outside Dia. Insulation / Pipe (Inches)	Color Field Length (Inches)	Letter Height (Inches)
0.5 – 1.25	8.0	0.50
1.5 – 2.00	8.0	0.75
2.5 – 6.0	12.0	1.25
8 – 10.0	24.0	2.50
Over 10.0	32.0	3.50

F. Stencil Paint: semi-glass enamel.

G. Plastic Pipe Markers: factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information shall indicating flow direction arrow and fluid being conveyed.

H. Plastic Tape Pipe Markers: flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

I. Utility Warning Tape: conform to local utility company requirements; durable impervious materials, designed to withstand extended underground exposure without material deterioration or fading of color; not less than 6 inches wide by 4 mil thick; imprinted with appropriate warning message. All tapes, unless otherwise directed by the local utility company, shall be detectable to a depth of at least three feet with a commercial radio-type metal locator.

Service	Color
Water Service	Blue
Storm and Sanitary Sewer	Green
Gas, Oil, Petroleum	Yellow
Communications and Fire Signal	Orange
Electrical Control Wiring	Red

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with paint manufacturer’s recommendations for stencil painting.

3.02 INSTALLATION

A. Plastic nameplates: install with corrosive-resistant mechanical fasteners or adhesive,

B. Plastic or Metal Tags: install with corrosive resistant chain.

C. Stencil Painting: apply in accordance with paint manufacturer’s recommendation.

D. Plastic Pipe Markers: install in accordance with manufacturer’s instructions.

E. Plastic Tape Pipe Markers: install completely around pipe in accordance with manufacturer's instructions.

F. Underground Plastic Pipe Markers: install 6 to 8 inches below finished grade, directly above buried pipe.

G. Equipment: identify pumps and fans with plastic nameplates, plastic or metal tags.

H. Controls: identify control panels and major control components outside panels with plastic nameplates.

I. Valves: identify valves in main and branch piping with tags.

J. Piping: identify piping mains, branches and risers, concealed or exposed, with plastic tape pipe markers or stencil painting. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs, including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

K. Ductwork: identify mains and branches, concealed or exposed. Identify service and flow direction. Locate identification for ductwork at each side of penetrations of structure and at each obstruction.

L. All automatic sprinkler piping/components shall be identified in accordance with NFPA 13 requirements.

M. All fire service mains/components shall be identified in accordance with NFPA 24 requirements.

3.03 VALVE CHART AND SCHEDULE

A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed by the Engineer.

B. Provide additional copies of Valve Chart for inclusion in O&M Manual.

END OF SECTION 15190

SECTION 15242 - VIBRATION ISOLATION AND SEISMIC RESTRAINTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of vibration isolation and seismic control shown on the contract drawings or specified herein. Vibration isolation shall be provided by each respective equipment manufacturer for installation by the mechanical contractor, unless otherwise indicated.

B. Equipment, piping, and ductwork – subject to objectionable vibration - shall be mounted on vibration isolators – or otherwise isolated to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.

C. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

D. Seismic restraints shall be in strict compliance with referenced Codes and Standards and the recommendations of the manufacturer.

E. The work in this section includes:

Vibration isolation for piping, ductwork and equipment.
Equipment isolation bases.
Flexible piping and duct connections.
Seismic restraints for equipment.

1.02 RELATED SECTIONS

Section 15140 – Supports and Anchors.
Section 15250 – Mechanical Insulation.
Section 15410/30/50 – Plumbing Piping, Specialties, Fixtures and Equipment.
Section 15510/15 – Hydronic Piping, Specialties and Equipment.
Section 15535 – Refrigerant Piping.
Section 15575 – Insulated Metal Flue.
Section 15625 – Fuel System.
Section 15835 – Terminal Heat Transfer Units.
Section 15870 – Exhaust, Ventilating and Return Fans.
Sections 15890/910 – Ductwork and Ductwork Accessories.
Division 16 – Electrical.

1.03 SUBMITTALS

A. Submit catalog cuts or product data sheets on vibration isolators and specific restraints.

B. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.

C. Provide all details of suspension and support for ceiling hung equipment.

D. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for

installation. Restraint manufacturer's submittals shall include spacing, static loads and seismic loads at all attachment and support points.

1.04 RELATED WORK

A. Housekeeping Pads – housekeeping pads shall be coordinated with restraint vendor and sized to provide a minimum edge distance requirements.

B. Supplementary Support Steel – supply supplementary support steel for all equipment, piping, ductwork, including roof mounted equipment as required.

C. Attachments – Contractor shall supply restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, and other attachment, in accordance with the requirements of the vibration vendor's calculations.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS and SEISMIC RESTRAINTS

A. Mason Industries' products are the basis of these specifications. Products of other manufacturers are acceptable, provided their systems strictly comply with requirements/specifications, and are approved by the Engineer.

B. Manufacturer's nominal two-inch (2") deflections shall be provided, unless otherwise indicated.

C. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or ¼" neoprene acoustical friction pad between the base-plate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and solid spring height. Mountings shall be by Type SLF as manufactured by Mason Industries, Inc.

D. Hangers shall consist of rigid steel frames containing minimum 1-1/4" thick neoprene elements at the top. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Spring shall be seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. In order to maintain stability, the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hose sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc from side to side before contacting the cup bushing and short circuiting the spring. Submittals shall include a hanger drawing showing the 30 degree capability. Hangers shall be type 30N as manufactured by Mason Industries, Inc.

E. Curb mounted rooftop equipment shall be mounted on spring isolation curbs. The lower member shall consist of a sheet metal Z-section containing adjustable and removable steel springs that support the upper floating section. The upper frame must provide continuous support for the equipment and must be captive so as to resiliently resist wind and seismic forces. All directional neoprene snubber bushings shall be a minimum of ¼" thick neoprene acoustical pads. Hardware

must be plated and the springs provided with a rust resistant finish. The curb weatherproofing shall consist of a continuous galvanized flexible counter flashing nailed over the lower curb's waterproofing and joined at the corners by EPDM bellow. Spring locations shall have access ports with removable waterproof covers. Lower curbs shall have a provision for 2" of insulation. The roof curb shall be built to seismically contain the rooftop equipment. The unit must be solidly fastened to the top floating rail, and the lower Z-section anchored to the roof structure. Curbs shall have an anchorage pre-approval "R" from OSHPD attesting to the maximum certified horizontal and vertical load ratings. Curbs to be type RSC as manufactured by Mason Industries, Inc., or approved equal. Roof curbs shall incorporate the following options:

1. Curbs to supply 3" deflection capability.
2. 2" thick double wall acoustical panels shall be supplied and installed at the top floating section of the roof curb. The perforated metal side of the panel is to face the interior of the curb in order to provide acoustical absorption. The solid metal side of the top panel shall face the rooftop unit base pan and act as a barrier. Panel openings to interface with the base pan of the rooftop unit. Acoustical panels shall be supplied by the curb manufacturer.
3. Curbs shall be factory sloped to match the roof pitch.
4. Curb manufacturer shall provide testing by an independent acoustical consulting engineer detailing a 26 dBA reduction in noise within the occupied space beneath the rooftop unit by utilizing the curb / panel assembly in conjunction with a properly isolated acoustical barrier ceiling.

F. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3" and larger shall be flanged. Smaller sizes shall have male nipples. Minimum manufacturer's recommended lengths shall be provided. Hoses shall be type BSS as manufactured by Mason Industries, Inc.

G. Seismic cable restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables must not be allowed to bend across sharp edges. Cable assemblies shall be Type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod nut and clevis or SCBV if clamped to a beam; all as manufacture by Mason Industries, Inc.

H. All directional seismic snubbers shall consist of interlocking steel members restrained by a shock absorbent rubber materials compounded to bridge bearing specifications. Elastomeric materials shall be replaceable and a minimum ¾" thick. Rated loadings shall not exceed 1000 psi. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8" nor more than ¼". Snubber shall be installed with factory set clearances. The capacity of the seismic snubber at 3/8" deflection shall be equal or greater than the load assigned to the mounting grouping controlled by the snubber multiplied by the applicable "G" force. Submittals shall include the load deflection curves up to ½" deflection in the x, y and z planes. Snubbers shall be series Z-1011 as manufactured by Mason Industries.

PART 3 - EXECUTION

3.01 GENERAL

A. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment, piping or duct work, resulting in stresses or misalignment.

B. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

C. Cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

D. Cable assemblies shall be installed taut on non-isolated systems. Seismic solid braces may be used in place of cables on rigidly attached systems only.

3.02 VIBRATION ISOLATION OF PIPING

A. Isolate piping unless otherwise indicated. The first three isolators from the isolated equipment shall have the same static defection as specified for the mountings under the connected equipment. Heat exchangers and expansion tanks are considered part of the piping run. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces, the first three hangers shall have 0.75” deflection for pipe sizes up to and including 3”; 1-1/2” deflection for pipe sizes up to and including 6”; and 2-1/2” deflection thereafter. Hangers shall be located as close to the overhead structure as practical.

B. Riser isolation shall be from hangers or anchors and guided with sliding guides. Steel springs shall be a minimum of 0.75” except in those expansion locations where additional deflection is required to limit load changes to plus or minus 25% anticipated expansion and construction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.

3.03 SEISMIC RESTRAINT OF PIPING

A. Seismically restrain all piping unless otherwise indicated.

1. Gas piping that is 1” I.D. or larger.

2. Piping located in Boiler Rooms and or Mechanical Equipment Rooms that is 1-1/4” I.D. and larger.

3. All other piping 2-1/2” diameter and larger.

B. Traverse piping restraints shall be at 40’ maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.

C. Longitudinal restraints shall be at 80’ maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.

D. Where thermal expansion is a consideration, guides and anchors ay 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.

E. For gas piping transverse restraints must be a 20’ maximum and longitudinal restraints at 40’ maximum spacing.

F. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24” of the elbow or Tee or combined stresses are within allowable limits at longer distances.

G. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.

H. Branch lines may not be used to restrain main lines.

I. Cast iron pipe of all types and any other pipes joined with a four bank shield and clamp assembly shall be braced.

3.04 VIBRATION ISOLATION OF DUCTWORK

A. All discharge runs for distances of 50’ from the connected equipment shall be isolated from the building structure by means of hangers or floor isolators. Spring deflection shall be a minimum of 0.75”, unless otherwise indicated.

B. All duct runs having air velocity of 1000 fpm or more shall be isolated from the building structure by hangers or floor supports. Spring deflection shall be a minimum of 0.75”, unless otherwise indicated.

3.05 SEISMIC RESTRAINT OF DUCTWORK

A. Seismically restrain all ductwork, unless otherwise indicated

1. Restrain rectangular ducts with cross sectional area of 6 square feet or larger.

2. Restrain round ducts with diameters of 28” or larger.

3. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.

B. Transverse restraints shall occur at 30’ 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.

C. Longitudinal restraints shall occur at 60’ intervals with at least one restraint per duct run. Transverse restraints for one duct suction may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4’ 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.

D. The ductwork must be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork shall be attached to both upper and lower trapeze.

END OF SECTION 15242

SECTION 15250 - MECHANICAL INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of mechanical insulation shown on the contract drawings or specified herein.

B. Insulation materials, including all weather and vapor barrier materials, closures, hangers, supports, fitting covers and other accessories, shall be furnished and installed in strict accordance with the drawings and specifications.

C. Piping insulation, jackets and accessories.

D. Equipment insulation and covering.

E. Ductwork insulation, jackets and lining.

F. The work also includes the repair/replacement of insulation on piping, equipment and/or ductwork disturbed by the work of this Contract.

G. The work also includes insulating the existing non-insulated domestic water tank in the Boiler Room.

1.02 RELATED SECTIONS

Section 15410/30/50 – Plumbing Piping, Specialties, Fixtures and Equipment.
Section 15510/15 – Hydronic Piping and Specialties and Equipment.
Section 15535 – Refrigerant Piping.
Section 15890/910 – Ductwork and Ductwork Accessories.
Section 15190 – Mechanical Identification.

1.03 SUPPLEMENTAL REFERENCES

A. ASHRAE 90.1-2001 Energy Standard for Buildings
B. ASTM C411 – Operating Temperature Range.
C. ASTM C1136 – Jacket Surface Temperature Limitations.
D. ASTM E96 – Jacket Permeance.
E. ASTM D781 – Puncture Resistance.
F. ASTM C335 – Thermal Conductivity.
G. ASTM E84 – Surface Burning Characteristics of Building Materials.
H. UL 723 – Surface Burning Characteristics of Building Materials.
I. ASHRAE 90.1 – Minimum Insulation Thickness.
J. ASTM C665, ASTM G21, 22 – Mold or Fungus Growth and Corrosiveness.
K. ANSI/ASTM C547 – Mineral Fiber Preformed Pipe Insulation.
L. ANSI/ASTM C195 – Mineral Fiber Thermal Insulation Cement.
M. ANSI/ASTM C533 – Calcium Silicate Block and Pipe Thermal Insulation.
N. ANSI/ASTM C552 – Cellular Glass Block and Pipe Thermal Insulation.
O. ANSI/ASTM C578 – Preformed, Block Type Cellular Polystyrene thermal insulation.
P. ASTM C585 – Inner and Outer Diameters of Rigid Pipe Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
Q. ASTM C1136 – Barrier Material, Vapor.
R. ASTM B209 – Aluminum and Aluminum-Alloy Sheet and Plate.
S. ASTM C449 – Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.

T. ASTM C610 – Expanded Perlite Block and Pipe Thermal Insulation.
U. NFPA 255 – Surface Burning Characteristics of Building Materials.
V. ANSI/ASTM C553 – Mineral Fiber Blanket and Felt Insulation.
W. ANSI/ASTM C612 – Mineral Fiber Block and Board Thermal Insulation.
X. UL 181 – Maximum Air Velocity.
Y. ASTM C518, C177 – Thermal Conductivity.
Z. ASTM C1104 – Water Vapor Sorption.
AA. ASTM D2020, C655, G21, G22 – Mold or Fungus Growth and Corrosiveness.
BB. ASTM C167 – Nominal Density.
CC. ASTM C1071, C423 – Sound Absorption.
DD. ASTM E96 – Vapor Permeance.

1.04 SUBMITTALS

A. Submit product data under provisions of the Contract Documents that apply to the work of this section.

B. Provide product description, list of materials and thickness for each service or requirement scheduled, locations, and manufacturer's installation instructions.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature and conditions required by the manufacturer of adhesives, mastics and insulation materials.

1.06 QUALITY ASSURANCE

A. Insulation thickness shall conform to ASHRAE 90.1-2001 energy standards.

B. Insulation materials furnished and installed hereunder shall meet the minimum economic insulation thickness requirements of the North American Insulation Manufacturers Association (NAIMA), formerly known as TIMA, to ensure cost-effective energy conservation performance.

C. Insulation Materials: Insulation materials shall be manufactured at facilities certified and registered with an approved registrar to conform to ISO 9000 Quality Standards.

D. Applicator: company specializing in mechanical insulation application with five (5) years minimum experience. Installers shall be skilled and experienced and regularly engaged in insulation work.

E. Materials: Insulation materials furnished and installed hereunder shall meet the fire hazard requirements of the following specifications:

American Society for Testing of Materials, ASTM E84.
Underwriters' Laboratories, Inc., UL 723.
National Fire Protection Association, NFPA 255.
Flame spread/fuel contributed/smoke developed rating of 25/25/50 shall be in accordance with ASTM E84, NFPA 255 and UL 723.

F. Calcium silicate products shall include a visual identification system to permit positive field determination of its asbestos-free characteristics.

1.07 DELIVERY AND STORAGE OF MATERIALS

A. All insulation materials and accessories shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identifications.

B. The contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use all means necessary to protect work and materials already installed by other trades.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – INSULATION

Schuller International.
Owens Corning.
Johns Manville.
Certainteed.
Substitutions: Under provisions of the Contract Documents.

2.02 PIPE INSULATION

A. Type P-1 Glass Fiber: Rigid, preformed, one-piece heavy density fiberglass meeting ASTM C547; non-combustible; hinged construction for ease of installation. Similar to Schuller Micro-Lok, or engineer approved equal.

1. 'K' Value: -0.23 at 75 degree F.

2. Maximum service temperature: 850 degrees F.

3. Vapor Retarder jacket: AP-T white Kraft paper, reinforced with glass fiber yarn and bonded to aluminum foil, secured with self-sealing longitudinal laps and butt strips or AP jacket with outward clinch expanding staples coated with vapor barrier mastic as needed. Any penetration of the jacket and all exposed ends of the insulation must be sealed with vapor barrier mastic for vapor barrier applications.

B. Type P-2 Hydrous Calcium Silicate: rigid, molded, asbestos-free, meeting ASTM C533; non-combustible; asbestos-free color coded throughout material's thickness and maintained throughout insulation recommended temperature range. Similar to Schuller Thermo-12 Gold, or engineer approved equal.

1. 'K' Value: 0.40 at 300 degrees F.

2. Maximum service temperature: 1200 degrees F.

3. Compressive strength (block): minimum of 200 psi to product 5% compression at 1-1/2 inch thickness.

4. Tie Wire: 16-gauge stainless steel with twisted ends on maximum 12-inch centers.

C. Fittings, Valves and Flanges

1. Fittings and valves shall be insulated with pre-formed fiberglass fittings, fabricated sections of fiberglass pipe insulation, fiberglass pipe and tank insulation, fiberglass blanket insulation or insulating cement. Thickness shall be equal to adjacent pipe insulation. Finish and jacketing shall match pipe insulation.

2. Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section, sized to provide the same insulation thickness as on the main pipe section. An oversized insulation section shall be used to form a collar between the two insulation sections with low-density blanket insulation being used to fill gaps. Finish and jacketing shall

match that used on straight pipe sections. Rough cut ends shall be coated with suitable weather or vapor resistant mastic as directed by system location and service.

3. On hot systems, where fittings are to be left exposed, insulation ends shall be beveled away from bolts for easy access.

4. On cold systems, particular care must be given to vapor sealing the fitting cover or finish to the pipe insulation vapor barrier. All valve stems must be sealed with caulking which allows free movement of the stem but provides a seal against moisture incursion.

D. Field Applied Jacket for Weatherproofing of Pipes Exposed to Outdoor Temperature and Conditions

1. PVC Plastic: Zeston 2000. One-piece molded type fitting covers and jacketing material, gloss white; connections – pressure sensitive color matching vinyl tape.

2. Canvas Jacket: UL listed fabric, 6 ounce/square yard plain weave cotton treated with dilute fire retardant lagging adhesive.

3. Aluminum Jacket: 0.016 inch thick sheet, longitudinal slip joints and 2 inch laps; die shaped fitting covers with factory attached protective liner.

4. Stainless Steel Jacket: Type 304 stainless steel, 0.010 inch.

5. Felt jacket: built-up 6 lb., 3-ply heavy duty roofing felt with all joints sealed with heavy application of bituminous compound.

6. On outdoor chilled water and/or refrigerant lines, the insulation system shall be completely vapor sealed before the weather-resistant jacket is applied. The outer jacket shall not compromise the vapor barrier by penetration of fasteners, etc. Vapor stops at butt joints shall be applied at every fourth pipe section joint and at each fitting to provide isolation of water incursion.

7. On outdoor plumbing lines, the insulation system shall be completely vapor sealed before the weather-resistant jacket is applied. The outer jacket shall not compromise the vapor barrier by penetration of fasteners, etc.

8. Entire assembly must be sealed waterproof to protect insulation.

2.03 EQUIPMENT INSULATION

A. Type E-1 Flexible Fiber Glass Blanket: spun-glass meeting ASTM C533; flexible. Similar to Schuller 812 Spin-Glas, or engineer approved equal.

1. ‘K’ Value: 0.24 at 75 degrees F.

2. Maximum service temperature: 450 degrees F.

3. Density: 1.5 pound/cubic foot.

4. Vapor Retarder Jacket: aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant Kraft, secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.

B. Type E-2 Rigid fiber Glass Board: spun glass meeting ASTM C612; rigid. Similar to Schuller 814 Spin-Glas, or engineer approved equal.

1. ‘K’ Value: 0.23 at 75 degrees F.
2. Maximum service temperature: 450 degrees F.
3. Density: 3.0 pound/cubic foot.
4. Vapor Retarder Jacket: aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant Kraft, secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.
5. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation, where indicated.

C. Type E-3 Rigid Fiber Glass Board: spun glass meeting ASTM C612, rigid. Similar to Schuller 1000 Spin-Glas, or engineer approved equal.

1. ‘K’ Value: 0.23 at 75 degrees F.
2. Maximum service temperature: 850 degrees F.
3. Density: 3.0 pound/cubic foot.
4. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation, where indicated.

D. Type E-4 Hydrous Calcium Silicate: rigid molded block, meeting ASTM C533; asbestos-free color-coded throughout material thickness, and maintained throughout temperature range. Similar to Schuller Thermo-12 Gold, or engineer approved equal.

1. ‘K’ Value: 0.40 at 300 degrees F.
2. Maximum service temperature: 1200 degrees F.
3. Compressive strength (block): minimum of 200 psi to produce 5% compression based on 1-1/2” thickness.
4. Non-combustible as determined by test following ASTM E136.
5. Securement: insulation shall be securely banded in place, tightly butted, joints staggered and secured with 16 gauge galvanized or stainless steel wire or ½” x 0.015” galvanized steel bands on 12” maximum centers for large areas.
6. Facing: 1 inch galvanized hexagonal wire mesh stitched on one face of insulation, where indicated.

2.04 DUCTWORK INSULATION

A. Ductwork shall be insulated with fiberglass insulation in roll, batt or board form. The insulation shall be selected to conform readily to the surface to which it will be applied, and the location. Before installing insulation, ascertain that all seams and joints in ductwork have been sealed by the duct system contractor.

B. Type D-1 Flexible Fiber Glass Blanket: flexible blanket meeting ASTM C553; similar to Schuller Microlite Type 75.

1. ‘K’ Value: 0.27 at 75 degrees F.
2. Density: 0.75 pound/cubic foot.
3. Vapor Barrier Jacket: FSK, aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant Kraft, secured with UL listed

pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed.

C. Type D-2 Rigid Fiber Glass Board: rigid board meeting ASTM C612; similar to Schuller 814 Spin-Glas.

1. 'K' Value: 0.23 at 75 degrees F.

2. Density: 3.0 pound/cubic foot.

3. Vapor Barrier Jacket: AP, bleached Kraft paper bonded to aluminum foil, reinforced with fiber glass yarn; or FSK, aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant Kraft, secured with UL listed pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed.

4. FSK, aluminum foil reinforced with fiberglass yarn and laminated to fire-resistant Kraft, secured with UL listed pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed.

D. Type D-3 Rectangular Duct Liner: ASTM C1071 with air surface coated with acrylic coating treated with EPA registered anti-microbial agent proven to resist microbial growth as determined by ASTM G21 and G22; similar to Schuller Permacote Linacoustic.

1. 'K' Value: ASTM C518, 0.25 at 75 degrees F.

2. Noise reduction coefficient: 0.70 or higher based on "Type A Mounting" and tested in accordance with ASTM C423.

3. Maximum Velocity: 5,000 feet/minute.

4. Adhesive: meeting ASTM C916.

5. Fasteners: duct liner galvanized steel pins, welded or mechanically fastened.

E. Type D-4 Round Duct Liner: rigid preformed round liner, similar to Schuller Permacote Spriracoustic, or with air surface coated with acrylic coating treated with EPA register anti-microbial agent proven to resist microbial growth as determined by ASTM G21 and G22, similar to Spiracoustic Plus.

1. 'K' Value: ASTM C518, 0.23 at 75 degrees F.

2. Noise reduction coefficient: 0.70 per ASTM C423 or higher based on "Type A Mounting" and tested in accordance with ASTM C423.

3. Maximum Velocity: 5,000 feet/minute.

F. Type D-5 same as Type D-2 for ducts outdoors exposed to weather with vapor barrier and application of built-up 3-ply heavy duty roofing felt; all seams and joints sealed to insure waterproof installation. In addition, top, sides and corners shall be covered with a tough surface wearing material to protect exposed surfaces from damage.

2.05 ACCESSORY MATERIALS

A. Accessory materials installed as part of the insulation work under this section shall include, but not be limited to:

1. Closure materials – butt strips, bands, wires, staples, mastics, adhesives, pressure-sensitive tapes.

2. Field applied jacketing – sheet metal, plastic, canvas, fiberglass cloth, insulation cement, PVC fitting covers, felt.

3. Support materials – hanger straps, hanger rods, saddles.

4. Fasteners, weld pins/studs, speed clips, insulation washers.

5. Metal mesh or expanded metal lagging.

B. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions and in conformance with the current edition of the Midwest Insulation Contractors Association (MICA) "Commercial and Industrial Insulation Standards".

C. Canvas Jacket: UL listed fabric, 6 ounce/square yard, plain weave cotton treated with dilute fire retardant lagging adhesive.

D. Aluminum Jacket: 0.016 inch thick sheet, smooth/embossed finish, with longitudinal slip joints and 2 inch laps.

E. Insulkote ET: a non water-vapor retarder, non-burning, weatherproof coating for use over insulation where "breathing" is required.

F. Zeston 2000 jacketing, UV resistant polyvinyl chloride covering with joints secured and sealed with Perma-Weld adhesive.

G. Built-up 3-ply heavy duty roofing felt: all seams and joints sealed to insure waterproof installation. Top, sides and corners covered with a tough surface wearing material to protect exposed surfaces from damage.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Before starting work, carefully inspect the site and installed work of other trades and verify that such work is completely to the point where installation of materials and accessories under this section can begin.

B. Verify by inspecting product labeling, submittal data, and/or certifications which may accompany shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

C. Verify that ductwork has been tested for leakage in accordance with SMACNA standards before applying insulation material.

D. Verify that all surfaces are clean, dry and free of foreign material, that all factory-applied vapor or weather barriers are intact and undamaged.

E. Insulation on cold surfaces must be applied with a continuous unbroken vapor seal. Hangers, supports, and anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation. All surface finishes are to be extended to protect all surfaces, ends, and raw edges of insulation.

3.02 INSTALLATION

A. Install materials in accordance with manufacturer's recommendations, recognized industry practices, building codes and industry standards.

B. All piping insulation shall be continuous through sleeves and wall and ceiling openings. Continue insulation with vapor barrier through penetrations, except where prohibited by code.

C. Piping Insulation

1. Locate insulation cover seams in least visible location.

2. Neatly finish insulation at supports, protrusions and interruptions.

3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self-sealing laps. Insulate complete system, including fittings, valves, unions, flanges, strainers, flexible connections and expansion joints.

4. In dual temperature systems, seal all pipe terminations including fittings, wall penetrations, and pipe supports with vapor barrier mastic. In brine or chilled water pipe systems, seal pipe terminations every four-pipe section.

5. For insulated pipes conveying fluids above ambient temperature, secure jackets with self-sealing lap or outward clinched, expended staples. Bevel and seal ends of insulation at equipment, flanges and unions.

6. Provide insert, not less than 6 inches long, between support shield and piping on piping 1-1/2”diameter or larger. Fabricate heavy duty density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths:

1-1/2” to 2-1/2” pipe size	10” long
3” to 6” pipe size	12” long
8” to 10” pipe size	16” long
12” and over	22” long

7. Pipe exposed in mechanical equipment or in finished spaces below 10 feet above finished floor: finish with Zeston 2000 PVC jacket and fitting covers or aluminum jacket.

8. For exterior applications: provide weatherproofing of pipes exposed to outdoor temperature and conditions. Insulated pipes, fittings, joints and valves shall be covered with felt jacket and sealed with bituminous compound. Entire assembly must be sealed waterproof to protect insulation.

D. Equipment Insulation

1. Apply insulation as close as possible to equipment by grooving, scoring and beveling insulation, if necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wire and bands.

2. Fill joints, cracks, seams and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retardant cement.

3. Provide insulated dual temperature equipment or cold equipment containing fluids below ambient temperature with vapor retardant jackets.

4. For insulated equipment containing fluids above ambient temperature, provide jacket with or without vapor barrier.

5. Cover insulation with aluminum jacket, or with metal mesh and finish with heavy coat of insulating cement mastic, as indicated on the drawings.

6. For equipment in mechanical equipment rooms or in finished spaces, finish with Zeston 2000 jacketing and fitting covers or aluminum jacketing.

7. Do not insulate over nameplates or ASME stamps. Bevel and seal insulation around nameplates or stamps.

8. When equipment with insulation required periodic opening for maintenance, repair or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.

9. Do not insulate factory-insulated equipment.

E. Ductwork External Insulation

1. Provide insulated ductwork conveying air below ambient temperature with vapor retardant jacket. Seal all vapor retardant jacket seams and penetrations with UL listed tapes or a vapor retardant adhesive.

2. Provide insulated ductwork conveying air above ambient temperature with or without vapor retardant jacket. Where service access id required, bevel and seal ends of insulation.

3. Continue insulation through walls, sleeves, hangers, and other duct penetrations except where prohibited by code.

4. The underside of duct work 24” or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18” on center. The protruding ends of the fasteners should be cut off.

5. For ductwork exposed to physical abuse in mechanical equipment rooms, or in finished spaces, finish with Zeston 2000 PVC jacket or aluminum jacket.

6. Corner angles shall be installed on all external corners or rigid duct insulation in exposed finished spaces before covering with jacketing.

7. For exterior applications, provide insulation with a weather protection jacket.

F. Duct Liner

1. Adhere insulation to sheet metal with full coverage of an adhesive meeting ASTM C916.

2. Secure insulation with mechanical liner fasteners as indicated by SMACNA, NAIMA, or manufacturer. Pin length should be as to limit compression of liner to 1/8”

3. All exposed edges of the liner must be factory or field coated. For systems operating at 4000 fpm or higher, a metal edge nosing must be installed in all liner leading edges.

4. Repair liner surface penetrations with adhesive meeting ASTM C916, similar to SuperSeal.

5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

G. Maintain the integrity of factory-applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage.

3.03 INSULATION SCHEDULE – NA indicates Not Applicable

HVAC Piping Services	Nominal Degree F	Insulation Type	Pipe Size	Insulation Thickness
Water Piping – Hot Water supply and return (S&R) & Chilled Water S&R	200 200 200	P1 P1 P1	½" to 2" 2-1/2" to 6" 8" and up	1.5 inch 2.0 inch 3.5 inch
Condensate Drains	50	P1	All	1.5 inch
Refrigeration Piping	-	P1	All	1.0 inch

A continuous vapor barrier must be applied to all insulation installed on piping conveying fluids below ambient temperature.

Plumbing Piping Services	Nominal Degree F	Insulation Type	Pipe Size	Insulation Thickness
Horizontal Storm Water Drainage Piping, Domestic Hot Water Piping	140	P1	All	1.5 inch
Domestic Cold Water Supply Condensate Drain Piping	50	P1	All	1.5 inch
Exposed Waste and Water Piping at Lavatories and Sinks Designed for Use by the Handicapped		Refer to Section 15450	All	Refer to Section 15450

A continuous vapor barrier must be applied to all insulation installed on piping conveying fluids below ambient temperature.

Ductwork Service – Thermal Insulation	Thermal Insulation Type	Insulation Thickness	Insulation Finish/Jacket
New Supply Ductwork Exposed in Equipment Rooms/Spaces	D-2 – Rigid External	2.0 inch	White foil backed Kraft Cloth; continuous vapor barrier
New Supply Ductwork, Concealed	D-1 –Blanket External	2.0 inch	FSK Aluminum Foil reinforced with fiber glass scrim laminated to UL rated Kraft; continuous vapor barrier
Ductwork Running in Unheated Spaces	D2 – Rigid External	3.0 inch	White foil backed Kraft Cloth; continuous vapor barrier
Exhaust Duct Within 10 feet of Exterior Openings	D2 – Rigid External	1.5 inch	White foil backed Kraft cloth; continuous vapor barrier.
New Outside Air Intake	D2 – Rigid	3.0 inch	White foil backed Kraft Cloth;

Plenums	External		continuous vapor barrier
Combustion Air Ducts	D2 – Rigid External	2.0 inch	White foil backed Kraft Cloth; continuous vapor barrier.

A continuous vapor barrier must be applied to all insulation installed on ductwork conveying air below ambient temperature.

All ductwork outside exposed to weather	D-5 - Rigid	3.0 inch	Type D-2 plus weather proof 3 ply membrane
Ductwork Service – Acoustic Insulation	Acoustic Insulation Type	Insulation Thickness	Insulation Finish/Jacket
Extent of Supply, Return, Intake and Exhaust Ductwork Acoustic Lining shall be as indicated on the Drawings or listed herein; but in no case shall the extent of Supply, Return, Intake and Exhaust Ductwork Acoustic Lining be less than 15 Linear Feet Before and After each AHU & Return Fan; and 10 LF for each FCU supply duct, or to the first 90 Deg bend or to the end of the respective duct branch.	D3 –Internal Acoustic	1.0 inch	Coated Air Side for 5000 FPM Air Velocity
All New Supply Ductwork Exposed In Mechanical Equipment Rooms	D3 – Internal Acoustic	1.0 inch	Coated air side for 5000 FPM Air Velocity

END OF SECTION 15250

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work of this section consists of furnishing all labor and materials, tools, equipment and services, and performing all operations required for complete design and installation of a hydraulically designed automatic sprinkler system and related work shown on the drawings or specified herein. All work shall be in strict accordance with requirements of the NFPA, Contract Documents and Authorities Having Jurisdiction.

B. The entire building shall not be sprinklered.

The New London City Hall Building is a Historic structure and certain spaces have architectural features warranting protection and preservation. The First, Second & Third Floor Lobbies and monumental Main Stairway which is open to all three floor Lobbies have been so designated.

Moreover, and in the interest of safety, and in keeping with permitting the existing monumental Main Stair that connects all three levels of the building and its associated landings, to remain a component of the means of egress Fire Officials have issued Modification Request # FM-0063-16 which calls for (among other things unrelated to fire suppression) the installation of a partial sprinkler system to serve the main stair and Lobbies.

In light of the above and in the interest of protecting important architectural features of the Lobbies and monumental Main Stairway the routing of new utilities shall be restricted and the impact of new piping and sprinklers on aesthetics, minimized.

Accordingly, the fire protection floor plans show specific locations designated acceptable for the routing and installation of piping risers and distribution mains. The contractor shall run risers and mains in the designated locations. Refer to the contract drawings for additional requirements.

C. The words “automatic sprinkler system”, “sprinkler system”, “fire protection system ” and “fire suppression system” are used interchangeably, herein, and on the contract drawings.

D. Engineer, design, furnish and install wet-pipe and dry-pipe sprinkler systems, in strict accordance with the requirements of the latest edition of NFPA 13.

E. The contractor shall arrange witness / conduct and pay for, independent hydrant flow test(s). The independent hydrant flow tests shall be performed following award of contract.

Hydrant Flow Test:

1. The installing sprinkler contractor shall base all hydraulic calculations, on the independent hydrant flow test(s), witnessed by him, and performed following the award of contract.

F. The Contractor shall engineer, design, furnish and install hydraulically designed system(s). Hatch patterns, sprinklers and piping shown on the drawings are intended to indicate areas of the building to be sprinklered. The number and location of automatic sprinklers shall be determined by the contractor using spacing rules and other applicable requirements of NFPA 13 for the respective Hazard Occupancy. Refer to the contract drawings for the Hazard Occupancy for the respective areas.

G. The drawings are diagrammatic. The number and location of automatic sprinklers, equipment and piping shown, are strictly diagrammatic and are intended for use by the contractor as a preliminary guide in the preparation of detailed working plans (shop drawings).

H. The contractor shall prepare detailed working plans and hydraulic calculations in strict accordance with the requirements of NFPA 13. The working plans and hydraulic calculations shall be performed under the direct supervision of a Professional Engineer licensed in the state where the work shall be performed. The signature and seal of the Professional Engineer under whose supervision the documents were prepared shall approve all Fire Suppression working drawings and hydraulic calculations.

I. All sprinkler system piping shall be concealed within building components, except where otherwise indicated.

J. In determining the final position of sprinklers, equipment and piping, the contractor shall coordinate with other trades and refer to the architectural reflective plans..

K. The Contractor shall coordinate his work with the construction documents and the work of other trades, including ceiling plans, in determining the final position of sprinklers, equipment and piping.

L. Furnish and install fire department connections.

M. Furnish and install pipe, fittings, valves and connections for a complete, operable, safe fire protections system. All pendent sprinklers shall be installed with return bends.

N. Underground water supply piping from the public supply to the building shall be furnished and installed by the automatic sprinkler contractor.

O. The automatic sprinkler contractor shall furnish and install signal wiring and conduit required for the automatic sprinkler system (above and below grade).

P. All components, including alarm, flow and tamper switches shall be furnished by the Automatic Sprinkler Contractor. All wiring for alarm, flow, and tamper switches shall be furnished and installed by a licensed electrical contractor. All alarm wiring shall be run in conduit.

Q. All components of the system shall be UL and FM labeled and approved for their intended use.

1.02 RELATED WORK

A. Section 15010 - Basic Mechanical Requirements.

B. Section 15140 - Supports and Anchors.

C. Section 15190 - Mechanical Identification.

D. Section 15410 – Plumbing Piping and Accessories.

E. Section 16721 – Fire Alarm System.

1.03 REFERENCES

A. NFPA 13 – Standard for the Installation of Sprinkler Systems.

B. NFPA 14 – Installation of Standpipe and Hose Systems.

C. NFPA 24 - Installation of Private Fire Service Mains.

D. NFPA 72 - Installation, Maintenance and Use of Protective Signaling Systems.

E. NFPA 101 - Life Safety Code

F. ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
G. NFPA Standard 291 -Fire Flow Testing and Marking of Hydrants.
H. NFPA Handbook Chapter - Testing of Water Supplies.
I. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings, Class 150 and 300.
J. ANSI/ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.
K. ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings.
L. ANSI/ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.
M. ANSI/ASME B16.11- Forged Steel Fittings, Socket-welding and Threaded.
N. ANSI/ASME B16.18- Cast Copper Alloy Solder-Joint Pressure Fittings.
O. ANSI/ASME B16.22- Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
P. ANSI/ASME B16.25- Buttwelding Ends.
Q. ANSI/ASME B36.10- Welded and Seamless Wrought Steel Pipe.
R. ANSI/ASME Section 9 - Welding and Brazing Qualifications.
S. ANSI/ASTM A135 - Electric-Resistance-Welded Steel Pipe.
T. ANSI/ASTM A47 - Malleable Iron Castings.
U. ANSI/ASTM B32 - Solder Metal.
V. ANSI/AWS A5.8 - Brazing Filler Metal.
W. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zing-coated Welded and Seamless.

X. ASTM A120 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated (Galvanized) Welded and Seamless, for Ordinary Uses.
Y. ASTM B75 - Seamless Copper Tube.
Z. ASTM B88 - Seamless Copper Water Tube.
AA. ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.

BB. ASSE, AWWA, IAPMO (UPC), SBCCI regulations and requirements.

1.04 SYSTEM DESCRIPTION

A. System to provide sprinkler coverage as indicated. Automatic sprinkler system shall consist of both wet-pipe.

B. The sprinkler contractor shall provide the interface with the new building fire alarm system

C. Provide hydraulically designed system to NFPA 13 requirements.

D. A minimum of 8 psi safety factor shall be provided.

E. Sprinkler system alarms shall include valve tamper, water flow, and automatic air pressure maintenance devices.

F. Provide fire department connections and post indicator valves as indicated.

G. All components of the automatic sprinkler system shall be rated for 175 psig working pressure.

H. All required offsets, fittings, materials, and/or other appurtenances required to avoid interference and fit the work into the space available are not shown and must be provided for a complete installation , and are included in the scope of the fire suppression work.

I. All components of the system shall be UL and FM labeled and approved for their intended use.

1.05 REGULATORY REQUIREMENTS

A. Hydraulic Calculations, Product Data and Shop Drawings shall bear the stamp of approval of Authority Having Jurisdiction, Fire Marshal, and Owner's fire insurance underwriter.

B. Hydraulic calculations and working drawings must be prepared under the direct supervision of a professional engineer, experienced in the design of this work, and licensed in the state where the work will be performed, using a UL approved calculation method. All documents prepared must bear engineer's stamp.

1.06 QUALITY ASSURANCE

A. Design and installation to conform to NFPA 13, Standard for the Installation of Sprinkler Systems.

B. Equipment and components shall bear UL label or marking, and carry FM approval.

C. The installing contractor shall be a company specializing in sprinkler system design and installation work, with a minimum of 10 years experience.

D. Valves shall bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E. Supply the services of an experienced and competent supervisor to be in charge of work at the site. The supervisor shall be experienced in similar responsible field positions.

F. All components of the new automatic sprinkler system shall be from the same manufacturer, or, if an auxiliary item, as recommended by the manufacturer of primary automatic sprinkler system components.

1.07 COORDINATION

A. The drawings are diagrammatic. The contractor shall refer to the plans of other trades in laying-out his work and shall verify the space in which the work of this section will be installed. All deviations from the drawings which require fittings, offsets and piping not shown on the drawings and necessary to complete the work and to fit the work of other trades, shall be provided by the contractor at his own expense.

B. The Contractor shall coordinate his work with the construction documents and the work of other trades, including ceiling plans, in determining the final position of sprinklers, equipment and piping

1.08 SUBMITTALS

A. Submit shop drawings and product data under provisions of the Contract Documents that apply to the work in this section. The contractor shall refer to specific submittal instructions referenced in Section 5, Shop Drawing of Working Procedures During Construction, applicable to automatic sprinkler systems.

B. The Contractor shall prepare detailed installation working drawings and calculations in accordance with NFPA requirements, and submit them in accordance with the provisions of the Contract Documents that apply to the work of this section. All of the information outlined in NFPA 13, shall be provided in the shop drawing submittal. Drawings and calculations shall bear the seal of the Engineer that prepared them.

C. The flow data, upon which the automatic sprinkler system has been designed, shall be submitted by the contractor along with hydraulic calculations.

D. Earthquake bracing shall be provided as required by the State Building Code. NFPA guidelines shall be followed. Shop drawing shall show proper arrows, reflecting location and type of bracing.

E. Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals.

F. Indicate valve data and ratings.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures. Maintain in place until installation.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of the Contract Documents that apply to the work in this section.

B. Include written maintenance data on components of system, servicing requirements, and Record Drawings.

C. The contractor shall furnish two (2) complete bound sets of operating and maintenance instructions for all equipment. Each manual shall have an index, tab type dividers, and all printed sheets shall be protected by clear plastic covers. Include maintenance and inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.11 EXTRA STOCK

A. Provide extra sprinkler heads under provisions of NFPA 13.

B. Provide suitable wrenches and escutcheon screw tools for each head type provided.

C. Provide metal storage cabinet, capable of storing all spare parts and tools.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - AUTOMATIC SPRINKLER SYSTEM COMPONENTS

A. Reliable.

B. Viking.

C. Grinnell.

D. Central.

E. Substitutions: Under provisions of the Contract Documents that apply to the work of this section.

2.02 SPRINKLER HEADS

A. All sprinkler heads shall be UL and FM approved for use with wet or dry fire protection systems. Sprinklers shall be temperature rated at 135°F in all areas of the building other than boiler rooms, where temperature rating shall be 165°F. Heads shall be provided with 1/2 inch orifices with 1/2 inch NPT threads, rated for U.S. K factor of 5.62, with bright chrome finish, unless otherwise indicated.

Refer to the drawings for specific installation areas and applications.

1. Recessed Pendent Type - standard response center strut; fusible alloy type; copper alloy base construction, two-piece construction with matching recessed escutcheon, similar to Reliable Model G-REC.

2. Pendant Type – standard response center strut; fusible alloy type; copper alloy base construction, with matching escutcheon plate, similar to Reliable Model G-SSP.

3. Upright Type – standard response center strut; fusible alloy type; copper alloy base construction, with matching escutcheon plate, similar to Reliable Model G-SSU.

4. Sidewall Type – horizontal, standard response, center strut; fusible alloy type; with matching escutcheon plate, similar to Reliable Model G-HSW1.

5. Recessed Horizontal Sidewall, standard response, center strut; fusible alloy type, two-piece construction with matching recessed escutcheon, similar to Reliable Model G/F1/HSW1.

6. Extended Coverage Sidewall Type - extended coverage, horizontal, center strut; fusible alloy type, with matching escutcheon plate, similar to Reliable Model G-EC4.

7. Concealed Head Type: Standard response concealed sprinkler. Field adjustable inlet for installation flexibility; standard pendent sprinkler recessed into the ceiling and concealed by flat cover plate with ½ inch adjustment. Cover plate shall be held in place by the same temperature classification solder that is used in the sprinkler. Similar to Reliable Model G4.

2.03 AUTOMATIC SPRINKLER ALARM VALVES

A. Wet-Pipe System - alarm valve for variable supply pressure conditions shall allow a continuous flow of water into the system and transmit an electrical alarm, when one or more automatic sprinkler operates. Alarm valve shall be similar to Reliable Model E, rated for 175 psi working pressure, factory hydrostatically tested to 350 psi; ANSI B 16.1 flanged inlet and outlet; complete with trim package including the necessary valves, gauges, fittings and nipples to provide retard chamber connection, drain connections, alarm connections, and alarm test bypass; pressure switch; retarding chamber; and piping necessary for proper operation. Valve shall be UL and FM approved.

B. Dry Pipe System - water supply control and alarm valve shall allow a continuous flow of water into the system and transmit an electric alarm, when one or more automatic sprinkler operates. Dry pipe valve shall be similar to Reliable Model D, rated for 175 psi working pressure, factory hydrostatically tested to 350 psi; ANSI B 16.1 flanged inlet and outlet; complete with trim package including the necessary valves, gauges, fittings and nipples to provide an air supply connection, priming water connection, drain connections, alarm connections, and alarm test bypass; and piping necessary for proper operation. Valve shall be UL and FM approved.

2.04 ACCELERATOR

For use with dry-pipe water supply control and alarm valve. Accelerator shall have integral anti-flooding device. Accelerator shall be similar to Reliable Model B1, complete with Model BD-2 accelerator trimmings, and shall be UL and FM approved.

2.05 FIRE DEPARTMENT CONNECTION (SIAMESE)

A. 6 x 2-1/2” x 2-1/2” x 2-1/2” x 2-1/2” triple clapper three-way inlet connection with 750 gpm inlet capacity. UL Listed; FM approved. Exposed design. Cast brass three-way inlet body with triple clappers and pin lug swivels. Brass branding plate. Standard cast brass finish. Similar to Croker No. 6461, or engineer approved equal.

B. Wall plate shall bear the appropriate words properly identifying the system, cast in letters to be at least one inch (1") high.

C. Coordinate with local fire department for hose thread compatibility and location of Fire Department Connection /Siamese.

2.06 WATER FLOW SWITCH

Vane type water flow detector switch shall be installed to signal any water flow condition in the wet pipe sprinkler system that equals or exceeds the discharge from one sprinkler head. Flow switch shall have two sets of electrical contacts for connection to alarm circuits, and an adjustable, instantly recycling pneumatic retard to prevent false alarms due to pressure fluctuations.

2.07 AIR COMPRESSOR - NA

2.08 AIR MAINTENANCE DEVICE - NA

2.09 AIR SUPERVISORY SWITCH - NA

2.10 CHECK VALVES

Provide Reliable Model D swing check valves to perform all regular check valve duties. Valve shall be UL and FM approved for use in fire protection systems. Valve shall have Standard Class 125 flanged connections with gaskets. Resilient “O” ring seating shall provide leak-tight sealing anti-stick operation and simple field replacement. Valve shall be rated for 250 psi working pressure and factory hydrostatically tested to 500 psi.

2.11 TAMPER SWITCH

Tamper switches shall be installed as indicated on the drawings. Switches shall be mounted so as not to interfere with the normal operation of the valve. The switch shall be contained in a durable metal enclosure with entrance for conduit and incorporate the necessary facilities for attachment to the valve. The switch assembly shall include contacts to actuate electric alarm bells, shunt trip devices and visual annunciating devices when tamper is detected. The entire installed assembly shall be tamper proof, lever type, and arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting. Switch shall be UL and FM approved.

2.12 ALARM GONG

Provide electric gongs and alarm switches. Gongs shall be eight inch (8") diameter, underwriters and FM approved, 120 volt type.

2.13 AUTOMATIC BALL DRIPS

The contractor shall provide, as required or indicated, automatic ball drips, 3/4" bronze with both ends threaded, similar to Reliable Model C. Pipe drain to spill over floor drain, through outside building wall, or as approved.

2.14 SPRINKLER CABINET

Provide enameled steel cabinet containing six extra sprinkler heads and a sprinkler head wrench for each type of sprinkler supplied, mounted in a location as directed.

2.15 INSPECTOR'S TEST CONNECTION

Refer to drawings for location and arrangement.

2.16 ACCEPTABLE MANUFACTURERS - INDICATOR POST AND GATE VALVES - NA

2.17 INDICATOR POST - NA

2.18 GATE VALVES FOR INDICATOR POST - NA

2.19 POST INDICATOR AND GATE VALVE SUPERVISORY SWITCH - NA

2.20 VALVE TAGS AND CHARTS

A. Furnish on all valves and controls, identifying numbered metal tags, including letter "S" to indicate system, fastened by heavy brass hook or chain. Tags shall be not less than two inches square, number 18 B&S gauge anodized aluminum or brass with stamped numbers and letters filled in with black paint.

B. Furnish diagrammatic charts showing essential features of each system with all valves and controls lettered and numbered to correspond to designation on metal tags. Also furnish a list of all valves and controls, giving location and function.

C. Charts and lists shall be mounted in glazed metal frames, permanently fastened in locations as directed.

2.21 PIPING MATERIALS

A. Wet Pipe Systems:

1. Steel, Schedule 40, ANSI/ASTM A53, ASTM A795, black steel pipe.

2. Copper Type L, ASTM B75, B88, B251.

B. Dry Pipe System: NA

C. All piping material shall be marked continuously along its length by the manufacturer to properly identify the type of pipe. This identification shall include the manufacturer’s name, model designation, or schedule.

2.22 PIPE FITTINGS

A. Steel Fittings: ANSI/ASME B16.9 wrought steel buttweld fittings; ANSI B16.25 buttwelding ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and flanged fittings; ANSI/ASME B16.11, forged steel socket welded and threaded.

B. Malleable Iron Fittings: Class 150 and 300, ANSI/ASME B16.3, screwed type.

C. Copper Fittings: ANSI/ASME B16.18, cast bronze, solder joint, pressure type; B16.22, wrought copper and bronze, solder joint, pressure type.

D. Cast Iron Fittings: Cast iron threaded fittings, Class 125 and 250, ANSI B16.4, and cast iron pipe flanges and flanged fittings, ANSI B16.1.

E. Fittings shall be extra-heavy pattern where pressures exceed 175 psi.

F. No cut grooves shall be permitted.

2.23 JOINING METHODS

A. All joining methods must be in strict accordance with NFPA 13.

1. Threaded: ANSI/ASME B1.20.1; threaded joint compound - non-toxic joint compound approved for use on potable water system; applied male threads only.

2. Solder: ANSI/ASTM B32, 95/5 alloy.

3. Brazing: ANSI/AWS A5.8.

4. Grooved: pipe joined with grooved fittings shall be joined by a listed combination of fittings, gaskets and grooves. Grooves rolled on pipe shall be dimensionally compatible with the fitting. No cut grooves shall be permitted. Grooved fittings, including gaskets used on dry pipe systems, shall be listed for dry pipe service.

5. Welded: AWS D10.9.

2.24 UNIONS, FLANGES, AND COUPLINGS

A. Screwed unions shall not be used on pipe larger than 2 inch. Couplings and unions of other than screwed-type shall be of types listed specifically for use in sprinkler systems.

B. Unions: 150 psi malleable iron for threaded ferrous piping.

C. Flanges: 150 psi forged steel slip-on flanges for ferrous piping.

2.25 HANGERS

Hangers for automatic sprinkler system piping and components shall be in strict accordance with NFPA 13 requirements.

2.26 ACCEPTABLE MANUFACTURERS - VALVES

A. Jenkins

B. Walworth.

B. Fairbanks.

D. Nibco.

E. Stockham.

F. Mueller Co.

G. Watts Regulator Co.

H. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

2.27 OS&Y GATE VALVES

Outside screw and yoke gate valve designed for fire protection service. Resilient seat gate valve shall have "O" ring seals, iron body, replaceable rubber seat, machined seating surface, bronze stem and traveling nut, flanged ends, and a hand wheel. Valve shall be rated for 175 psi working pressure and tested to 350 psi. Valve shall be UL and FM approved, similar to Mueller Co. No. A-2073.

2.28 GLOBE OR ANGLE VALVES

A. Bronze, rising stem, inside screw, renewable composition disc.

B. Iron body, bronze trim, rising stem, OS&Y, renewable composition disc.

2.29 CHECK VALVES

A. Bronze, swing disc.

B. Iron body, bronze trim, swing disc, renewable disc and seat.

C. Iron body, bronze trim spring loaded, renewable composition disc.

2.30 DRAIN VALVES

A. Bronze compression stop with nipple and cap or hose thread.

B. Brass ball valve with cap and chain, 3/4 inch hose thread.

2.31 VALVE CONNECTIONS

A. Provide valve connections to match pipe joints. Use valves of pipe size.

B. For copper tube, provide threaded solder adapters for connection to valve.

2.32 PROVISION FOR FLUSHING SYSTEMS

All sprinkler systems shall be arranged for flushing. Readily removable fittings shall be provided at the end of all cross mains. All cross mains shall terminate in 1-1/4” or larger pipe. All branch lines on gridded systems shall be arranged to facilitate flushing.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends to full inside diameter.

B. Remove burrs and bevel plain end ferrous pipe.

C. Remove scale and foreign material, inside and outside, before assembly.

3.02 INSTALLATION

A. All sprinkler heads shall be installed in strict accordance with manufacturer's recommendations and NFPA 13 requirements, using manufacturer approved wrench/tool.

B. All sprinkler heads shall be installed with return bend.

C. All hose stations shall be installed in strict accordance with manufacturer's recommendations and NFPA 14 requirements.

D. The Contractor shall coordinate his work with the construction documents and the work of other trades, including ceiling work, in determining the final position of sprinklers, equipment and piping.

E. Screw joint steel piping up to and including 1-1/2 inch diameter.

F. Mechanical grooved joints with heavy-duty mechanical joint fittings or couplings may be used instead of threaded or welded joints. No cut grooves shall be permitted.

G. Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

H. Coat threaded ends with pipe lubricant compound.

I. Saddle branch connections or direct connection of branch lines to mains is not permitted.

J. Solder or braze copper tubes.

K. Install piping in accordance with NFPA 13 for sprinkler systems.

L. Do not penetrate building structural members unless indicated. Attachment devices recommended by NFPA are permitted.

M. Provide sleeves when penetrating footings, floors and walls.

N. Seal all pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required, with fire-proof sealant.

O. Connection to existing water service: The contractor shall provide fittings and adapters required for compatible connection to the existing water service.

P. Provide double check backflow preventer assembly at sprinkler system water source connection.

Q. Locate fire department connection with sufficient clearance from walls or obstructions to allow full swing of fire department wrench handle.

R. Locate outside alarm gong on building wall as indicated or directed by the authority having jurisdiction.

S. Place pipe runs to minimize obstruction to other work.

T. Install valves with stems upright or horizontal, not inverted.

U. Provide gate valves for shut-off or isolating service.

V. Butterfly valves may not be used instead of gate valves.

W. Provide drain valves at main shut-off valves, low points of piping and apparatus.

3.03 CLEANING

A. All sprinkler systems shall be arranged for flushing. Readily removable fittings shall be provided at the end of all cross mains. All cross mains shall terminate in 1-1/4" or larger pipe. All branch lines on gridded systems shall be arranged to facilitate flushing.

B. Flush entire piping system of foreign matter.

C. Underground mains and lead-in connections to system risers shall be completely flushed before connection is made to sprinkler piping, in accordance with NFPA 13 and NFPA 24.

3.04 SYSTEM TESTS AND ACCEPTANCE

A. Systems shall be tested in accordance with NFPA. Refer to applicable NFPA standards for specific test requirements. The Contractor, upon completion of testing, shall complete and sign the appropriate Contractor's Material and Test Certificate[s] and deliver them to the Owner.

B. Tests shall be witnessed by authority having jurisdiction. Notify the authority having jurisdiction, owner's representative and engineer of the time and date testing will be performed. Provide adequate notice to allow schedule coordination.

C. The installing contractor shall provide the owner with literature and instructions provided by the manufacturer describing proper operation and maintenance of all equipment and devices installed.

D. The installing contractor shall identify the hydraulically designed sprinkler system in accordance with NFPA 13 requirements.

E. The installing contractor shall train representatives of the Owner in the operation of the installed systems.

END OF SECTION 15310

SECTION 15410 - PLUMBING PIPING AND ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of plumbing piping and accessories shown on the contract drawings or specified herein.

B. Pipe and pipe fittings.

C. Valves.

D. Sanitary sewer piping.

E. Domestic water piping, including new street main.

F. Vent piping.

G. Natural Gas piping.

1.02 SUPPLEMENTAL REFERENCES

A. ANSI/ASME B16.3 – Malleable Iron Threaded Fittings Class 150 NS 300.
B. ANSI/ASME B16.23 – Cast Copper Alloy Solder Joint Drainage Fittings – DWV.
C. ANSI/ASME B16.29 – Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings – DWV.
D. ANSI/ASME Section 9 – Welding and Brazing Qualifications.
E. ANSI/ASTM B32 – Solder Metal.
F. ANSI/AWS D1.1 – Structural Welding Code.
G. ANSI/AWWA C105 – Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
H. ANSI/AWWA C110 – Ductile Iron and Gray Iron Fittings 3 Inch through 48 Inch, for Water and Other Liquids.
I. ANAI/AWWA C111 – Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
J. ANSI/AWWA C151 – Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
K. ASME – Boiler and Pressure Vessel Code.
L. ASTM A53 – Pipe, Steel, Black and Hot Dipped Zinc Coated, Welded and Seamless.
M. ASTM A74 – Cast Iron Soil Pipe and Fittings.
N. ASTM A120 – Pipe, Steel, Black and Hot Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Use.
O. ASTM A234 – Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
P. ASTM B88 – Seamless Copper Water Tube.
Q. ASTM B306 – Copper Drainage Tube (DWV).
R. ASTM C14 – Concrete Sewer, Storm Drain, and Culvert Pipe.
S. ASTM C564 – Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
T. AWS A5.8 – Brazing Filler Metal.
U. AWWA C651 – Standard Methods for the Examination of Water and Waste Water.
V. AWWA C601 – Standard Methods for the Examination of Water and Waste Water.

W. CISPI 301 – Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
X. NFPA 54 – National Fuel Gas Code.
Y. NFPA 58 – Standard for the Storage and Handling of Liquefied Petroleum Gases.

1.03 DESIGN STANDARDS

A. Piping is shown diagrammatically and exact location and elevation shall be as indicated or required to meet existing conditions.

B. The contractor shall refer to the plans of other trades in laying out the work and shall verify the space in which the work will be installed. All deviations from the drawings, which are necessary to complete the work and to fit the work of other trades, shall be made by the contractor at his own expense. The contractor shall coordinate space requirements with other trades before submitting shop drawings for approval.

C. Piping shall be run straight and direct as possible, in general forming right angles with or parallel to walls or other piping and neatly spaced, with risers erected plumb and true. The contractor shall maintain the pitch of lines, running all piping straight, true and free of traps. Piping shall be installed so that there is clearance of at least one inch between finished covering of piping and adjoining work.

D. Piping shall be hung above the ceiling from construction above, as close as possible to bottom of floors, joints, beams, etc., maintaining maximum headroom.

E. Provide valves, unions or flanges in connections to risers, bypasses and all equipment.

F. Provide control valves where noted or required for complete regulating control of all systems, plumbing fixtures and equipment. Valves shall be installed such that they are accessible, and in no case shall handles point down.

G. No exposed chrome plated piping at fixtures and equipment shall show tool marks or more than one thread at fittings.

H. Joints in screwed piping shall be made with approved compound placed on male threads only. No lamp-wick shall be used in joints. Flanged joints shall be made with full-faced gaskets. Solder joints for copper tubing shall be made with non-corrosive paste flux and solid string or wire solder in accordance with manufacturer's instructions b thoroughly competent workmen and code requirements.

I. The contractor shall provide all piping required to connect apparatus, complete and ready for regular and safe operation. Unless otherwise noted, connect all apparatus and equipment in accordance with manufacturer's instructions and details shown in the construction documents.

J. Arrange piping for maximum accessibility for maintenance and repair; locate valves for easy access and operation.

K. Unless otherwise noted, sanitary waste piping 3" or larger in diameter shall be pitched at least 1/8" per foot and piping less than 3" in diameter shall be pitched at ¼" per foot. Vent piping shall be minimum pitch sufficient to insure adequate venting and drainage.

L. Make adequate provisions for proper expansion and contraction of piping. At connections of branches to water mains and risers and at connections to heater, tank, pumps, coolers and other equipment, provide sufficient number of elbow swings to allow for proper expansion and contraction of piping. Provide adequate elbow swings, goosenecks or expansion loops, wherever indicated or required to allow for proper expansion and contraction of mains and risers.

M. Provide individual water branches to fixtures with shock absorbers as specified. Provide over-rim water supplies to plumbing fixtures and equipment. Provide connections to water closets with vacuum breakers.

N. All new piping shall be labeled and color-coded by service. Contractor shall also provide brass valve tags and a valve chart for all valves.

O. Any wall, floor, roof and ceiling penetrations shall be sealed following installation to ensure the effectiveness of the wall, floor, roof or ceiling and its fire rating.

1.04 QUALITY ASSURANCE

A. All components shall meet applicable Federal, State and Local codes, standards, regulations and requirements pertaining to safe drinking water, including the standards of the Safe Drinking Water Act and Lead Contamination Control Act, latest editions.

1.05 SUBMITTALS

A. Submit product data under the provisions of the Contract Documents that apply to the work of this section.

B. Include data on pipe materials, pipe fittings, valves and accessories.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under the provisions of the Contract Documents that apply to the work of this section.

B. Store and protect products under the provisions of the Contract Documents that apply to the work of this section.

C. Deliver and store valves in shipping containers with labels in place.

PART 2 - PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED

A. Cast Iron Pipe: ASTM A74 hub and spigot extra-heavy weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene extra heavy gasketing system, or lead and oakum. Pipe, fittings and gasket (if used) shall of the same manufacturer.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 hub and spigot service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene service weight gasketing system, or lead and oakum. Pipe, fittings and gasket (if used) shall of the same manufacturer.

B. Cast Iron Pipe: CISPI 301 no hub ASTM A888, service weight. Fittings: Cast iron. Joints: Neoprene couplings with stainless steel clamp-and-shield assemblies. Pipe and fittings shall of the same manufacturer.

C. Piping less than 3” shall be either:

1. Copper pipe: ASTM B306, DWV. Fittings: ANSI/ASME B16.3, cast bronze or ANSI/ASME 16.29, wrought copper, long radius drainage pattern fittings for waste. Joints: ANSI/ASTM B32, solder.

2. Schedule 40 galvanized steel pipe, ASTM A53, with galvanized threaded cast iron drainage pattern fittings for waste and malleable iron fittings for vents.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE AND INSIDE

A. Copper Tubing: ASTM B88, Type L, seamless hard drawn. Fittings: ANSI/ASME B16.18 or B16.22, cast brass or wrought copper. Joints: ANSI/ASTM B32 solder, Grade 95TA, lead free.

2.04 VENT PIPING, ABOVE GROUND

A. Copper Pipe: ASTM B306, DWV. Fittings: ANSI/ASME B16.3, cast bronze or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 50B.

B. Cast Iron Pipe: ASTM A74 hub and spigot service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene service weight gasketing system, or lead and oakum. Pipe, fittings and gaskets (where used) shall of the same manufacturer.

C. Cast Iron Pipe: CISPI 301 no hub ASTM A888, service weight. Fittings: Cast iron. Joints: Neoprene couplings with stainless steel clamp-and-shield assemblies. Pipe and fittings shall of the same manufacturer.

2.05 CONDENSATE DRAINS AND OVERFLOWS

A. Copper Tubing: ASTM B88, type L, hard drawn. Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 solder wrought copper. Joints: ASTM B32, solder, Grade 95TA, 95 percent Tin/Antimony.

2.06 NATURAL GAS SYSTEM

A. The contractor shall furnish and install a new gas system. The complete installation shall meet all requirements of NFPA 54 - National Fuel Gas Code, local plumbing codes, and the local authority having jurisdiction.

B. Piping:

1. Inside, Aboveground: Steel Pipe, ASTM A53 Schedule 40, black; fittings malleable iron, suitable for working pressure of 125 psig; screwed joints.

2. Outside, Aboveground: Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ANSI/ASME B16.3, malleable iron, or ASTM A234 forged steel welding type. Joints: Screwed for pipe two inches and under; ANSI/AWS D1.1, welded for pipe over two inches.

3. Underground: Steel Pipe, ASTM A53 or A120, Schedule 40 black; fittings forged steel welding type; joints ANSI/AWS D1.1 welded; with

ANSI/AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

C. Gas regulators, valves and appurtenances shall meet the requirements of the applicable standards and codes for applicable flow and pressure requirements.

D. Avoid running gas piping underground - within the building footprint. Run gas piping underground - within the building footprint – only as specifically indicated on the contract drawings, and only with the written approval of the local utility company and engineer. All underground gas piping - within the building footprint - shall be encased in a continuously welded gas tight casing/sleeve, which shall be vented to the atmosphere. Encasement piping and vent piping shall be Schedule 40 black steel, mill wrapped, with continuously welded joints. All underground gas piping - within the building footprint - and encasement piping shall meet the specification requirements applicable to underground piping. Terminate vent using listed peck vent fitting. Work shall be in accordance with NFPA 54, 58 and 101.

E. All gas piping within the building which crosses corridors shall be encased in a continuous air-tight, welded gas tight casing/sleeve, which shall be vented to the atmosphere. Encasement piping and vent piping shall be Schedule 40 black steel, mill wrapped, with continuously welded joints. All gas piping within the building footprint which crosses corridors and encasement piping shall meet the specification requirements applicable to underground piping. Terminate vent using listed peck vent fitting. Work shall be in accordance with NFPA 54, 58 and 101.

2.07 GAS PIPING ACCESSORIES

A. Gas regulators, valves, meters and appurtenances shall be in accordance with requirements of NFPA 54 –National Fuel Gas Code, and NFPA 58 – Standard for the Storage and Handling of Liquefied Petroleum Gases for applicable flow and pressure requirements, and local utility company requirements.

B. Lubricated Plug Valves shall be high strength cast iron body conforming to ASTM A126 Class B; 200 WOG; low-friction-coated plug, wrench operated; malleable iron retainer for sizes to 1”, high strength cast iron retainer for sizes 2” through 8”. Flanged ends for sizes over 2” (ANSI B16.1), screwed ends for sizes 2” and less (ANSI B2.1). Valves shall be Walworth Figure 1700(F) or approved equal. Provide valve with wrench and lubricant for natural gas service.

C. Where indicated on the plans, gas piping shall be encased. Outer encasement jacket shall be schedule 40 black steel pipe with continuously welded ends, which form an air-tight enclosure. The annular space must be pressure tested in strict accordance with the latest edition of applicable codes.

2.08 FUEL OIL PIPING

A. Not Applicable.

2.09 FLANGES, UNIONS AND COUPLINGS

A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, flared joints.

B. Pipe Size Over 2 Inch: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16 inch thick preformed neoprene.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.10 ACCEPTABLE MANUFACTURERS – GATE, GLOBE, BALL, BUTTERFLY AND CHECK VALVES

Nibco.
Walworth.
Hammond.
Grinnell.
Stockham
Watts.
Substitutions: Under provisions of the Contract Documents.

2.11 GATE VALVES

A. Up to 2 Inches: Valves shall be Class 125 rising stem, union bonnet, solid wedge. Body, bonnet and wedge shall be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B371 or low zinc alloy B-99; non-asbestos packing and malleable or ductile iron handwheel. Where higher operating pressure approach 150 psi, Class 150 union bonnet valves of like construction shall be used. Valve ends shall be threaded or solder types.

B. Over 2 Inches: Valve shall be Class 125, flanged, bolted bonnet, OS&Y, iron body, bronze trimmed with body and bonnet conforming to ASTM A126 Class B cast iron. Packing and gaskets to be non-asbestos.

2.12 GLOBE/ANGLE VALVES

A. Up to 2 Inches: Valves shall be Class 125; body and bonnet shall be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing, TFE seat disc and malleable or ductile iron handwheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction shall be used. Valve ends shall be threaded or solder types.

B. Over 2 Inches: Valves shall be Class 125, flanged, bolted bonnet, OS&Y, iron body, bronze trimmed with body and bonnet conforming to ASTM A126 Class B cast iron. Packing and gaskets to be non-asbestos.

2.13 BALL VALVES

A. Up to 2-1/2 Inches: Valves shall be rated 150 psi SWP and 600 psi non-shock WOG and have two-piece cast bronze bodies, TFE seats, standard port, separate packingnut with adjustable stem packing, anti-blowout stems and chrome plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction shall be used. Valve ends shall have full depth ANSI threads or extended solder connections.

B. Where piping is insulated, ball valves shall be equipped with 2” extended handles of non-thermal conductive material. Provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the

insulation. Memory tops, which are fully adjustable after insulation is applied, shall be included.

2.14 BUTTERFLY VALVES

A. Valves shall be lug ends, rated at least 200 psi non-shock cold water working pressure. Body shall have 2" extended neck for insulating and shall be cast iron or ductile iron. Valve shall have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2-1/2" – 6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have weatherproof gear operators. Lug-style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges.

2.15 SWING CHECK VALVES

A. Up to 2 Inches: Valve shall be Y-pattern swing-type, Class 125, bronze ASTM B-62 body with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends shall be threaded or solder types.

B. Over 2 Inches: Valves shall be swing-type, Class 125, flanged ASTM A126 Class B cast iron body with bronze trim, non-asbestos gasket.

2.16 PRESSURE REDUCING VALVES

A. Up to 2 Inches: Bronze body, stainless steel and thermoplastic internal parts, fabric-reinforced diaphragm, strainer, threaded ends.

B. Over 2 Inches: Cast iron body, bronze fitted, elastomer diaphragm and seat disc; flanged.

2.17 ACCEPTABLE MANUFACTURERS – RELIEF VALVES

ITT Bell & Gossett.
Zurn Industries.
Watts Regulator Company.
Armstrong International Company.
Substitutions: Under provisions of the Contract Documents.

2.18 RELIEF VALVES

Bronze body, Teflon seat, steel stem and springs, automatic direct pressure actuated, capacities ASME certified and labeled.

2.19 EXPANSION SWINGS

Make adequate provision for proper expansion and contraction of piping. At connections of branches to water mains, and riser and at connections to equipment, provide sufficient number of elbow swings to allow for proper expansion and contraction of piping. Provide adequate elbow swings, goosenecks, or expansion loops, wherever indicated or required to allow for proper expansion and contraction of mains and risers.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Remove scale and dirt, on inside and outside, before assembly. Prepare piping connections to equipment with flanges

or unions. Coordinate compatibility of pipe end connections with specialty and equipment connections to insure proper joining method.

3.02 INSTALLATION

A. Provide non-conducting dielectric connections wherever joining dissimilar metals.

B. Provide access at all concealed valve locations.

C. Route piping in orderly manner and maintain gradient.

D. Install piping to conserve space and not interfere with the use of space. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not exposed. Coordinate size and location of access.

H. Slope water piping and arrange to drain at low point.

I. Establish invert elevations, slope for drainage to 1/8 inch per foot inside building; one percent minimum outside buildings beyond five feet. Maintain gradients.

J. Excavate, trench and backfill in accordance with specification requirements for the work of this section.

K. Install valves with stems upright or horizontal, not inverted.

L. Joints in screwed piping shall be made with approved compound placed on male threads only. No lamp-wick shall be used in joints.

M. Flanged joints shall be made with full-faced gaskets.

N. Solder joints for copper tubing shall be made with non-corrosive paste flux and solid string or wire solder. Multi-tip ring torch shall be used in making joints 1-1/2 inches and larger.

O. All solder and joint compound, and any other components, which may come in contact with potable water, must be absolutely free of lead.

P. Install and test gas piping in accordance with NFPA 54. Provide dirt pockets on gas lines in accordance with utility company and building code requirements.

Q. Horizontal storm drainage piping shall be insulated with 2” fiberglass insulation with vapor barrier. Pitch horizontal storm drainage piping as indicated on the drawings and required by code. Refer to Section 15250.

3.03 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper pie systems. Sweat solder adapters to pipe.

C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D. Install ball or butterfly valves for throttling, bypass, on manual flow control services.

3.04 CLEANING AND TESTING

A. Exercise every precaution to avoid introducing foreign matter such as welding beads and slag or dirt into piping system. Hammer completed welds to loosen debris. All piping, valves and fittings shall be internally cleaned prior to assembly.

B. Following fabrication and erection clean all piping by flushing with clean water and run to waste until clean.

C. Inspect and clean all strainers.

D. The Contractor shall provide all materials, supplies and labor required for testing. Piping system shall be pressure tested in accordance with state and local codes.

E. Unless otherwise specified, all piping carrying pressures of less than 100 psi shall be hydrostatically tested to 150 psi. Piping carrying pressures of 100 psi or more shall be hydrostatically tested to 1-1/2 times operating pressure. Tests shall be of two-hour duration, during which time piping shall show no leaks. Piping failing testing shall be repaired and retested by the Contractor.

F. The Contractor shall be responsible for properly disinfecting and pressure testing new fire mains. All activities to be coordinated with the water department and comply with AWWA standards.

3.05 DISINFECTION OF WATER PIPING SYSTEMS

A. Applicable to new piping installed and portions of existing piping affected by the work. Prior to starting work, verify system is complete, flushed, tested and clean.

B. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali or acid.

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal t that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

END OF SECTION 15410

SECTION 15430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of plumbing specialties and accessories shown on the contract drawings or specified herein.

B. Floor Drains.
C. Cleanouts.
D. Water Hammer Arrestors.
E. Hose Bibbs and Wall Faucets.
F. Wall Hydrants/Frost Free Sill Cock.
G. Backflow Preventers.
H. Air Gaps.
I. Trap Seal Primer.
J. Deep Traps.
K. Thermostatic Mixing Valves.
L. Flashing.
M. Heat Tracing.

1.02 RELATED WORK

Section 15140 - Supports and Anchors.

Section 15410 - Plumbing Piping.

Section 15450 – Plumbing Fixtures and Equipment.

Section 15000 - Access Doors.

1.03 SUPPLEMENTAL REFERENCES

A. ANSI/ASME 1012 – Backflow Preventers with Immediate Atmospheric Vent.

B. ANSI/ASME 1011 – Hose Connection Vacuum Breakers.

C. ANSI/ASME 1013 – Backflow Preventers, Reduced Pressure Principles.

D. ANSI/ASME 1019 – Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

E. ANSI A112.21.1 – Floor Drains.

F. AWWA C511 – Reduced Pressure Principle Backflow Prevention Assembly.

G. AWWA C510 – Double Check Valve Backflow Prevention Assembly.

H. PDI WH-201 – Water Hammer Arresters.

1.04 QUALITY ASSURANCE

A. Manufacturer: for each product specified, provide components by same manufacturer throughout.

B. All components shall meet applicable Federal, State and Local codes, standards, regulations and requirements pertaining to safe drinking water, including the standards of the Safe Drinking Water Act and Lead Contamination Control Act, latest editions.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of the contract documents.

PART 2 - PRODUCTS

1.01 ACCEPTABLE MANUFACTURERS –DRAINS, CLEANOUTS, INTERCEPTORS, CARRIERS, ARRESTORS, FITTINGS, WALL HYDRANTS, HOSE BIBBS

Josam.
Wade.
Smith.
Zurn Industries.
Mifab.
Submit shop drawings and product data under provisions of the contract documents.

1.02 FLOOR DRAINS

A. Basement – Water Service Area – Josam 32330 series coated cast iron Floor Drain, deep two-piece body with double drainage flange, WEJLOC non-puncturing flashing clamp collar, weepholes, bottom outlet, round top and removable sediment bucket which supports a medium-duty loose-set anti-tilting SUPER-FLO grate with perimeter slots.

B. Toilet Room Floor Drains – Josam 30000-S Series, with ½" primer tap, coated cast iron Floor Drain, two-piece body with double drainage flange, WEJLOC invertible non-puncturing flashing collar, weepholes, bottom outlet and adjustable satin Nikaloy square SUPER-FLO strainer.

C. Basement & Attic - Mechanical Equipment Room Floor Drains – Josam Series 32200, 12-5/8" round top with ½" primer tap coated cast iron Floor Drain, shallow two-piece body with double drainage flange, WEJLOC non-puncturing flashing collar, weepholes, bottom outlet, round top, and medium-duty loose-set anti-tilting SUPER-FLO grate with perimeter drainage slots. Drains to have LEVELEZE adjustable extension, special duty grate, satin finish Nikaloy top.

All floor drains shall be provided with - a trap-seal primer tap, a trap-seal primer, air gap, and valved ½-inch cold water supply.

1.03 ROOF DRAINS

Josam 22200 - Combination Roof Drain with Overflow - coated cast iron Roof Drain, beehive dome, non-puncturing clamp ring with integral gravel stop and medium sump with roof flange and bottom outlet.

1.04 CLEANOUTS

A. Cast Brass Cleanouts - full size for up to four inch (4"), and at least half-size for larger pipes, with 4" minimum.

B. Wall Plate Cleanouts – extend cleanout in or behind walls or partitions with stainless steel wall plate.

C. Cleanout Deck Plates – extend cleanout to piping under floor and terminate with deck plates. Cleanouts shall be Superseal and inside caulk and lead seal with tractor cover, similar to Josam 58680.

D. Toilet and Mechanical Equipment Room Cleanouts – cast Nikaloy deck access cleanouts with threaded satin scoriated cover with spanner wrench sockets and inside caulk connections, similar to Josam 58670.

1.05 ACCEPTABLE MANUFACTURERS – WATER HAMMER ARRESTORS, HOSE BIBBS, HYDRANTS

A. Josam.

B. Watts.

C. Zurn Industries.

D. Wade.

E. Substitutions: Under provisions of the Contract documents that apply to the work of this section.

1.06 WATER HAMMER ARRESTORS

ASSE 1010 and ANSI A112.26.1M approved; PDI WH-201 approved and certified. Copper body; EPDM seals and O-ring; brass piston and cap; pre-charged air chamber; NPT solid hex brass adapter; factory air charged, permanently capped and epoxy sealed. Capable of installation at any angle and may be installed in concealed locations with access door. Provide connection adapter where required. Watts Series 15, or engineer approved equal.

1.07 HOSE BIBBS

Hose bibbs shall be cast brass, similar to Watts No. HB-1 with vacuum breaker and built-in backflow preventer.

1.08 WALL FAUCETS

Wall faucets in toilet rooms shall be chrome plated, key operated. ¾ inch hose thread, approved under ASSE Standard 1011, brass construction, adjustable packing nut with deep stem guard, Teflon impregnated packing and standard “O” size washer. Similar to Woodford Manufacturing Model 24P.

1.09 WALL HYDRANTS – OUTDOOR (FFSC)

Provide JOSAM 71050 Series cast bronze non-freeze wall Hydrant with satin finish Nikaloy face, 3/4"H.P.T. outlet, integral vacuum breaker-backflow preventer, pressure relief valve, bronze casing, bronze operating parts convertible into service tool, 3/4" female and 1" male N.P.T. inlet connection. Provide wall clamp and union elbow assembly. Field measure and coordinate installation with wall thickness to insure proper fit.

1.10 ACCEPTABLE MANUFACTURERS – BACKFLOW PREVENTION DEVICES

A. Zurn/Wilkins.

B. Watts.

C. Hersey Products.

D. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.11 BACKFLOW PREVENTION DEVICES

A. Reduced Pressure Zone Backflow Preventers

1. Sizes ¾" – 2" shall have quarter-turn, full port resilient seated bronze ball valve shut-offs, similar to Watts Model 909. Replaceable bronze seats, dual ported relief, captured spring assemblies, and bronze strainer shall be provided. Assembly shall be rated for pressures up to 175 psi and temperatures to 140°F.

2. Sizes 2-1/2" – 10" shall have outside stem and yoke resilient seated gate valve shut-offs, similar to Watts Model 909OSY. Bronze bodies with replaceable bronze seats; stainless steel internal parts, FDA approved epoxy coated check and relief valves, captured spring assemblies, epoxy coated cast iron relief valve with stainless steel seat, and FDA approved epoxy coated strainer. Assembly shall be rated for pressures up to 175 psi and temperatures to 140°F continuous.

3. Reduced pressure backflow preventer shall consist of two independently operating, spring loaded, "Y" pattern check valves and one hydraulically dependent differential relief valve, with shut off valves and ball type test cocks. All bronze valve body, caps, relief valve body and cover. Replaceable bronze seats, stainless steel internal parts. Fully ported, bronze gate valve shut offs.

4. Backflow preventer shall be serviceable in line; maximum operating pressure 175 psi; temperature range 33 degrees F to 140 degrees F; UL, FM, AWWA and ASSE approved.

5. Install valves with manufacturer's minimum recommended clearance for servicing, but no less than 12 inches between port and floor or grade.

1.12 AIR GAP FITTING

A. Fixed air gap, dura-coated cast iron with slip joint inlet and no-hub outlet. Similar to Zurn Z-1025, or engineer approved equal.

1.13 TRAP SEAL PRIMER

A. Automatic all bronze body trap primer with removable operating parts, integral vacuum breaker and gasketed access cover; similar to Zurn ZARB-1022 or engineer approved equal.

B. Primer connection shall be dura-coated cast iron body with female thread side inlet trap primer location; similar to Zurn Z-1023 or engineer approved equal.

1.14 DEEP SEAL TRAPS

A. Provide for all floor drains - Zurn Z-1000 deep seal trap, dura-coated cast iron body with bottom bronze cleanout plug – unless otherwise indicated.

1.15 FLASHING

Provide, at all roof penetrations and where indicated on the drawings, approved watertight flashing. Coordinate with roofing contractor.

PART 3 - EXECUTION

1.01 PREPARATION

1. Coordinate cutting or forming of floor construction to receive drains to required invert elevations.

1.02 INSTALLATION AND APPLICATION

A. Install specialties in strict accordance with manufacturer's instructions to permit intended performance.

B. The contractor shall provide thrust blocks, anchors and restraints at all changes in direction, changes in size, terminal or deal ends and at all valves related to underground piping.

C. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

D. All floor drains shall be fitted with a trap seal primer.

E. Install access doors where required to service concealed specialties.

F. Limit stops on all thermostatic mixing valves shall be set to 110°F. The contractor shall confirm setting at time of installation.

G. Install backflow preventer meeting Authority Having Jurisdiction's minimum recommended clearances and manufacturer's minimum recommended clearances for servicing, but no less than 12 inches between port and floor or grade. The more stringent dimensions shall apply. Provided drain line with air gap.

H. Install water hammer arrestors complete with accessible isolation valve and access door for all quick closing valves.

I. Install water hammer arrestors on all quick closing valves.

J. Coordinate cutting or forming of floor construction to receive drains to required invert elevations.

END OF SECTION 15430

SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of plumbing fixtures and equipment shown on the contract drawings or specified herein.

B. Lavatories, Water Closets, Urinals, & Electric Water Coolers

C. All Related Trim and Carriers.

1.02 RELATED WORK

D. Custom Casework: preparation of counters for sinks.

E. Section 15140 - Supports and Anchors.

F. Section 15242 – Vibration Isolation and Seismic Restraints.

G. Sections 15410 and 15430 - Plumbing Piping and Specialties

H. Section 15250 - Piping and Equipment Insulation.

I. Section 15510/15 – Hydronic Piping and Specialties.

1.03 QUALITY ASSURANCE

A. Fixtures: By same manufacturer for each product specified throughout.

B. Trim: By same manufacturer for each product specified throughout.

C. All components shall meet applicable Federal, State and Local codes, standards, regulations and requirements pertaining to safe drinking water, including the standards of the Safe Drinking Water Act and Lead Contamination Control Act, latest editions.

D. All components designated for use by the handicapped shall meet the American Disabilities Act Guidelines and ANSI A117.1 Requirements for Accessible and Usable Building Facilities.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of the contract documents that apply to the work in this section.

B. Include dimensional drawings.

PART 2 - PRODUCTS

2.01 GENERAL

A. Fixtures shall be of the finest quality genuine vitreous china, stainless steel or acid resisting enameled cast iron, as specified, free of all defects.

B. Fixtures shall have manufacturer's guarantee label or trademark indicating first quality grade.

C. Exposed pipe, fittings, traps, escutcheons, valves, valve handles and accessories, both above and below the fixtures shall be chrome-plated brass. Water supplies and drainage nipples to wall shall have set-screw cast brass escutcheons.

Lavatory and sink traps shall be brass. Exposed fixture traps shall have cleanout plugs. Supply fixtures shall have renewable seats and composition washers.

D. For installations intended for use by the handicapped, mount fixtures in accordance with requirements of American Disabilities Act Guidelines and ANSI A117.1 Requirements for the Physically Challenged, and the Architect's instructions.

E. Offset water supplies, drains and tail pieces underneath sink or lavatory to permit handicapped access, and to meet ANSI standards pertaining to handicapped accessibility and usability. Exposed pipes and surfaces under lavatories and sinks shall be insulated to meet ANSI standards pertaining to handicapped accessibility and usability.

2.02 ACCEPTABLE MANUFACTURERS – FIXTURES

American Standard, Kohler, Crane, Eljer, Elkay, Moen, Fiat

2.03 KITCHEN EQUIPMENT - NA

3.01 PLUMBING FIXTURES - SCHEDULE

Refer to Contract Drawings Plumbing Fixture Schedule.

2.04 DOMESTIC HOT WATER RECIRCULATING PUMP - NA

2.05 DOMESTIC WATER HEATERS

Refer to Drawing Schedules.

2.06 INSULATION (FOR USE UNDER HANDICAPPED LAVATORIES)

A. Zeston PVC vapor barrier protective jacketing system consisting of pre-molded white gloss Zeston PVC insulated trap and valve covers and fiberglass insulation inserts, similar to Schuller Zeston Snap-Trap, Swivel P-Trap and Supply Valve Cover. Covers shall be removable for maintenance and reusable. Covers shall comply with Uniform Federal Accessibility Standards and ANSI Standard A117-T.

B. Flame spread/fuel contributed/smoke developed rating of 25/25/50 in accordance with ASTM E84, NFPA 255 and UL 723.

PART 3 - EXECUTION

3.02 INSPECTION

1. The Contractor must coordinate with the Architect, the requirements for the casework, to insure proper fit.

2. Verify final positioning of all fixtures, including mounting height with the Architect prior to start of work.

3. Coordinate and confirm all clearances required to achieve ADA requirements, for example, mounting heights and knee clearances with the Architect prior to roughing and installation.

4. Confirm location and size of fixtures and openings before rough-in and installation.

5. Verify adjacent construction is ready to receive rough-in work of this section.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Provide suitable reinforcement for all wall supports.

E. Install and secure fixtures in place with wall supports or carriers and bolts.

F. Seal fixtures to surfaces with sealant.

G. Offset water supplies, drain and tail piece to permit handicapped access underneath sink or lavatory to meet ANSI standards pertaining to handicapped accessibility and usability.

H. Exposed pipes and surfaces under lavatories or sinks shall be insulated to meet ANSI Standards pertaining to handicapped accessibility and usability.

I. Provide drain for shower and eye/face wash station in accordance with manufacturer's recommendations.

J. Provide floor drain outside handicapped showers.

K. There shall be no sharp or abrasive surfaces under lavatories or sinks.

L. Confirm all mounting heights and locations of all fixtures with the Architect prior to installation.

M. Provide shock absorbers and access doors at the end of hot and cold water branches.

N. Provide vacuum breakers for all hot and cold water faucets and outlets.

3.04 ADJUSTING, CLEANING AND MAINTENANCE

A. Adjust stops or valves for intended water flow rate to fixture without splashing, noise or overflow.

B. At completion, clean plumbing fixtures and equipment.

C. Emergency fixtures shall be minimally tested weekly for proper operation.

END OF SECTION 15450

SECTION 15510 - HYDRONIC PIPING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of hydronic piping and accessories shown on the contract drawings or specified herein.

1.02 RELATED WORK

A. Section 15242 - Vibration Isolation and Seismic Restraints.
B. Section 15250 - Mechanical Insulation.
C. Section 15515 - Hydronic Specialties.
D. Section 15540 – HVAC Pumps.
E. Section 15600 – Existing Boiler.
F. Section 15835 - Terminal Heat Transfer Units.

1.03 DESIGN STANDARDS

A. Piping shown is diagrammatic, and exact location and elevations shall be as indicated or required to meet existing conditions.

B. Piping shall be run straight and direct as possible, in general forming right angles with or parallel to walls or other piping, and neatly spaced, with risers erected plumb and true. Piping shall be installed so that there is clearance of at least one inch between finished covering of piping and adjoining work.

C. The Contractor shall provide valves, unions or flanges in connections to risers, bypasses and all equipment.

D. Joints in screwed piping shall be made with approved compound placed on male threads only. No lamp-wick shall be used in joints.

E. Threads shall be perfect, clean cut and proper length. Pipe shall be properly reamed after cutting and threading.

F. Flanged joints shall be made with full-faced gaskets.

G. Solder joints for copper tubing shall be made with non-corrosive paste flux and solid string or wire 95-5 solder in accordance with manufacturer's instructions and by thoroughly competent workmen. Tubing shall be carefully cut square, burrs removed, and ends and fitting sockets thoroughly mechanically cleaned and properly fluxed before assembly.

H. The Contractor shall provide all piping required to connect equipment, complete and ready for regular and safe operation. Connect all apparatus and equipment in accordance with manufacturer's details and as specified herein.

I. Arrange piping for maximum accessibility for maintenance and repair; locate valves for easy access and operation. Install unions or flanges in piping attached to equipment for ease of removal and service.

J. Make adequate provisions for proper expansion and contraction of piping. At connections of branches to mains and risers and at connections to equipment, provide sufficient number of elbow swings to allow for proper expansion and contraction of piping. Provide adequate elbow swings, goosenecks or expansion loops, wherever indicated or required to allow for proper expansion and contraction of mains and risers.

K. Refer to the plans of other trades in laying out the work and shall verify the space in which the work will be installed. All deviations from the drawings, which are necessary to complete the work and to fit the work of other trades, shall be made by the contractor at his own expense. Coordinate space requirements with other trades before submitting shop drawings for approval.

1.04 SUPPLEMENTAL REFERENCES

A. ANSI/ASME – Boiler and Pressure Vessel Code.
B. ANSI/ASME Section 9 – Welding and Brazing Qualifications.
C. NFPA 51B – Standard for Fire Prevention in Use of Cutting and Welding Processes.
D. ANSI/ASME B16.3 – Malleable Iron Threaded Fittings Class 150 and 300.
E. ANSI/ASME B16.23 – Cast Copper Alloy Solder Joint Drainage Fittings – DWV.
F. ANSI/ASME B16.29 – Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
G. ANSI/ASME B31.9 – Building Services Piping.
H. ANSI/AWS A5.8 – Brazing Filler Metal.
I. ANSI/AWS D1.1 – Structural Welding Code.
J. ASTM A53 – Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
K. ASTM A120 – Pipe, Steel, Black and Hot-Dipped Zinc Coated Galvanized, Welded and Seamless, for Ordinary Uses.
L. ASTM B32 – Solder Metal.
M. ASTM B88 – Seamless Copper Water Tube.

1.05 SUBMITTALS

Submit product data under provisions of the Contract Documents, include data on pipe materials, pipe fittings, valves, and accessories, include welder' certification of compliance with ANSI/ASME Section 9 and ANSI/AWS D1.1.

PART 2 - PRODUCTS

2.01 SUPPLY AND RETURN PIPING – HOT WATER

A. Steel Pipe: ASTM A53 or A120, Grade A or B, Schedule 40 for sizes through 12 inch, black, plain end.

1. Fittings: ANSI/ASTM B16.3, malleable iron screwed fittings, 150 psi; or ANSI B16.9 ASTM A234, forged steel welding type fittings, rated for 150 psi.

2. Joints: Less than 4 inches – screwed; over 4 inches – ANSI/AWS D1.1, butt welded.

3. For restrictions on welding procedures, refer to Section 01100, Special Project Procedures, in the Supplementary General Conditions.

B. Copper Tubing: ASTM B88, Type L hard drawn, 3/8 inch through 3 inch.

1. Fittings: ANSI B16.18 cast pressure solder-joint; ANSI/ASME B16.22 wrought pressure solder joint.

2. Joints: ASTM B32, solder, Grade 95TA, 95 percent Tin/Antimony.

C. All dissimilar pipe materials must be separated by approved dielectric unions or flanges

2.02 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53 or A120, Schedule 40 galvanized.

1. Fittings: Galvanized cast iron, or ANSI/ASTM B16.3 malleable iron.

2. Joints: Screwed, or grooved mechanical couplings.

B. Copper Tubing: ASTM B88, Type L hard drawn.

1. Fittings: ANSI B16.23 cast solder joint fitting; ANSI/ASME B16.29 wrought solder joint fitting.

2. Joints: ASTM B32, solder, Grade 95TA, 95 percent Tin/Antimony.

C. All dissimilar pipe materials must be separated by approved dielectric unions or flanges.

2.03 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 inches and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe size over 2 Inches: 150 psig forged steel slip-on flanged ANSI B16.1 for ferrous piping; bronze flanges for copper piping; EPDM gasket.

C. The Contractor shall provide dielectric unions or flanges to separate dissimilar piping materials.

2.04 ACCEPTABLE MANUFACTURERS – GATE, GLOBE, BALL, PLUG, BUTTERFLY AND CHECK VALVES

Nibco, Walworth, Jenkins, Grinnell, Stockham, Watts - Substitutions: Under provisions of the Contract Documents.

2.05 GATE VALVES

A. Up to 2 Inches: Bronze body, bronze trim, rising stem hand wheel, inside screw, single wedge or disc, solder or threaded ends. Class 125 minimum safe working pressure rating shall be 125 psig.

B. Over 2 Inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, single wedge, flanged ends. Class 125, minimum safe working pressure rating shall be 125 psig.

2.06 GLOBE VALVES

A. Up to 2 Inches; Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable composition disc, solder or screwed ends, with backseating capacity repackable under pressure. Class 125, minimum safe working pressure rating shall be 125 psig.

B. Over 2 Inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc. Class 125, minimum safe working pressure rating shall be 125 psig.

2.07 BALL VALVES

A. Up to 2 Inches: Bronze one piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends. Class 125, minimum safe working pressure rating shall be 125 psig.

B. Over 2 Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, or gear drive hand wheel for sizes 10 inches and over, flanged. Class 125, minimum safe working pressure rating shall be 125 psig.

2.08 PLUG COCKS

A. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends, with one wrench operator for every ten plug cocks. Class 125, minimum safe working pressure rating shall be 125 psig.

B. Over 2 Inches: Cast iron body and plug, pressure lubricated, Teflon packing, flanged ends, with wrench operator with setscrew. Class 125, minimum safe working pressure rating shall be 125 psig.

2.09 BUTTERFLY VALVES

A. Iron body, stainless steel disc, resilient replaceable seat for service to 250 degrees f, wafer or lug ends, extended neck, 10 position lever handle; handwheel and gear drive over 3-1/2". Class 125, minimum safe working pressure rating shall be 125 psig.

2.10 SWING CHECK VALVES

A. Up to 2 Inches: Bronze 45-degree swing disc, solder or screwed ends. Class 125, minimum safe working pressure rating shall be 125 psig.

B. Over 2 Inches: Iron body, bronze trim, 45-degree swing disc, renewable disc and seat, flanged ends. Class 125, minimum safe working pressure rating shall be 125 psig.

2.11 ACCEPTABLE MANUFACTURERS – RELIEF VALVES

ITT Bell & Gossett, Mueller Brass Company, Watts Regulator Company, Zurn Industries, Armstrong International, Copes-Vulcan, Inc. - Substitutions: Under provisions of the Contract.

2.12 RELIEF VALVES

Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment with flanges or unions.
D. After completion, fill, clean and treat systems.

3.02 INSTALLATION

A. Piping shall be run in wall chases, recesses, pipe shafts, pipe space of cabinets, and hung ceiling, where same are provided. No piping shall be run in floor fill, unless specifically indicated or approved.

B. Piping hung above the ceiling from construction above shall be run as close as possible to bottom of slabs, beams, etc., maintaining maximum headroom.

C. Install piping close to structural framing. Route piping in orderly manner; plumb and parallel to building structure, and maintain gradient.

D. Install piping to conserve building space, and not interfere with use of space and other work.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with surface finish to insure neat, clean appearance.

I. Slope piping and arrange system to drain at low points. Use eccentric reducers to maintain top of pipe level.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc primer to welding.

K. The Contractor shall provide thrust blocks at all changes in direction, changes in size, terminal or dead ends, and at all valves related to underground piping.

L. Prepare pipe, fittings, supports, and accessories for finish painting.

M. Install valves with stems upright or horizontal, not inverted.

N. Label and color-code new piping by service.

O. Flanged joints shall be made with full faced gaskets.

P. The contractor shall not permanently close up, fir in or cover piping before examination and testing.

3.03 APPLICATION

A. Install dielectric unions or flanges where joining dissimilar materials.

B. Install unions downstream of valve and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install ball or butterfly valves for throttling, bypass, or manual flow control services.

F. Use plug cocks for throttling service. Use non-lubricated plug cocks only when shut-off or isolating valves are also provided.

G. Provide gate drain valves at main shut-off valves, low points of piping, bases of vertical risers, at equipment, and as otherwise indicated.

H. Install chain operators on valves with centerline elevation of greater than 7 feet above finished floor.

3.04 CLEANING AND TESTING

A. Exercise every precaution to avoid introducing foreign matter such as welding beads and slag or dirt into piping system. Hammer completed welds to loosen debris. All piping, valves and fittings shall be internally cleaned prior to assembly.

B. Following fabrication and erection, clean all piping by flushing with clean water ad run to waste until clean.

C. Inspect and clean all strainers, seals, seats, orifices, gauge glasses and glands, etc.

D. The contractor shall provide all materials, supplies and labor required for testing. Notify Engineer and Authorities Having Jurisdiction in ample time to be present for final testing of all piping.

E. Unless otherwise specified, all piping carrying pressures of less than 100 psi shall be hydrostatically tested to 150 psi. Piping carrying pressures of 100 psi or more shall be hydrostatically tested to 1-1/2 times operating pressure. Tests shall be of two-hour duration, during which time piping shall show no leaks. Piping failing testing shall be repaired and retested by the contractor.

END OF SECTION 15510

SECTION 15515 - HYDRONIC SPECIALTIES AND EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of hydronic specialties and accessories shown on the contract drawings or specified herein. Hydronic specialties include:

1. Flow Balancing Devices.
2. Compression/Expansion Tank(s).
3. Air Vents.
4. Air Separator(s).
5. Strainers.
6. Triple duty Valves.
7. Suction Diffusers.
8. Combination Pump Discharge Valves.
9. Flow Indicators, Controls and Meters.
10. Relief Valves.

1.02 RELATED WORK

A. Section 15250 – Mechanical Insulation.
B. Section 15515 - Hydronic Specialties.
C. Section 15540 – HVAC Pumps.
D. Section 15755 – Heat Exchangers.
E. Section 15835 - Terminal Heat Transfer Units.

1.03 QUALITY ASSURANCE

Manufacturer: for each product specified, provide components by same manufacturer throughout.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of the contract documents that apply to the work in this section.

B. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

C. Submit inspection certificates for pressure vessels from Authority Having Jurisdiction.

D. Submit manufacturer's installation instructions under provisions of the Contract Documents that apply to the work in this section.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of the Contract Documents that apply to the work in this section.

B. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of the Contract Documents that apply to the work in this section.

B. Store and protect products under provision of the Contract Documents that apply to the work in this section.

PART 2 - PRODUCTS

1.01 ACCEPTABLE MANUFACTURERS – FLOW BALANCING DEVICES

A. ITT Bell & Gossett.
B. Armstrong.
C. Dunham Bush.
D. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.02 FLOW BALANCING DEVICES

A. Valves to be designed to allow installing contractor to pre-set balance points for proportional system balance prior to system start up.

B. All valves ½ inch to 3 inch pipe size to be of bronze body/brass ball construction with glass and carbon filled TFE seat rings. Valves to have differential pressure read-out ports across valve seat area. Read-out ports to be fitted with internal FPT inserts and check valves. Valve bodies to have ¼ inch NPT tapped drain/purge port. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated name plates to assure specific valve settings. Valves to be leak tight at full rated working pressure.

C. Valves 4 inch pipe size to be of cast iron body/brass vane construction with differential pressure read-out ports and valves as above.

D. Preformed insulation – all valves to be provided with molded insulation to permit access for balancing and read-out.

E. Design Pressure / Temperature

1. ½ inch through 3-inch NPT connections 300 psig at 250 degrees F.

2. ½ inch and ¾ inch sweat connections 200 psig at 250 degrees F.

3. 4 inch flanged connections 125 psig at 250 degrees F.

1.03 ACCEPTABLE MANUFACTURERS – COMPRESSION/EXPANION TANKS

A. ITT Bell & Gossett.
B. Hoffman.
C. Adamson.
D. Taco.
E. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.04 COMPRESSION/EXPANSION TANKS

Construction: Pre-charged, steel expansion tank with replaceable heavy-duty butyl rubber bladder. The tank shall have an NPT system connection, appropriately sized for the service, ¾ inch NPT drain, and a .302”-32 charging valve connection to facilitate the on-site charging of the tank to meet system requirements. The tank shall be fitted with lifting rings and a floor mounting skirt for vertical installation. The tank must be

constructed and stamped in accordance with Section 8D of ANSI/ASME Code and stamped 125 PSI working pressure.

1.05 ACCEPTABLE MANUFACTURERS – AIR VENTS

A. ITT Bell & Gossett.
B. Armstrong.
C. Amtrol.
D. Armstrong Int. Inc.
E. Spirax Sarco.
F. Taco.
G. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.06 AIR VENTS

A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

B. Float Type: Brass or semi-steel body, copper float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; (125 psig and 200 degrees F) with isolating valve.

1.07 ACCEPTABLE MANUFACTURERS – AIR SEPARATORS

A. ITT Bell & Gossett.
B. Domestic.
C. Amtrol.
D. Taco.
E. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.08 AIR SEPARATORS

A. Centrifugal type air separator, similar to ITT Bell & Gossett Rolairtrol Model R, constructed, tested and stamped in accordance with Section 8D of ANSI/ASME Code, for 125 psig operating pressure; flanged inlet and outlet connections tangential to the vessel shell. Vessel shell diameter to be three times the nominal inlet/outlet pipe diameter.

B. The unit shall have an internal stainless steel air collector tube with 5/32” diameter air collector tube with 5/32” diameter perforations and 63% open area designed to direct accumulated air to the compression tank via an NPT connection at the top of unit.

C. The unit shall have a removable galvanized steel system strainer with 3/16 inch diameter perforations and a free area of not less than five times the cross-sectional area of the connecting pipe. A blowdown connection shall be provided to facilitate routine cleaning of the strainer.

D. Manufacturer shall furnish data sheet specifying air collection efficiency and pressure drop at rated flow.

E. A manufacturer’s Data Report for Pressure Vessels, Form U-1 as required by the provisions of the ASME Boiler and Pressure Vessel Code shall be furnished for each air separator upon request.

1.09 ACCEPTABLE MANUFACTURERS - STRAINERS

A. ITT Bell & Gossett.
B. Mueller.
C. Armstrong.
D. Taco.
E. Spirax Sarco.
F. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.10 STRAINERS

A. Size ¾ inch to 2 inch: self-cleaning "Y" type screwed end strainers, cast iron ASTM A-126 Class B; rated at 400 psi at 150 degree F working pressure.

Screen: 20-mesh stainless steel (1/32" openings).

Construction: machined seat in body designed to make the screen self aligning and hold screen securely in place by straight threaded and gasketed cap. Blowoff Outlets: tapped NPT connection.

B. Size 2-1/2 inch to 4 inch: flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

C. Size 5 inch and larger: flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

1.11 ACCEPTABLE MANUFACTURERS – TRIPLE DUTY VALVES

A. ITT Bell & Gossett.
B. Armstrong.
C. Domestic.
D. Taco.
E. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.12 TRIPLE DUTY VALVES

A. Straight pattern valve designed to perform the functions of a non-slam check valve, positive shut-off valve, throttling valve, calibrated balancing valve, and system flow-meter; similar to ITT Bell & Gossett Model 3DS.

B. Valve shall be heavy-duty cast iron construction with 125 psig ANSI flanged connections, rated for a maximum working pressure of 175 psig at 250 degree F. Valve shall be fitted with EPDM soft seat, replaceable bronze disc, stainless steel stem and chatter-preventing spring. The valve design shall permit repacking under full system pressure.

C. Each valve shall be equipped with brass readout valves with integral check valve for taking differential pressure readings across the orifice to accurately balance the system to specified design conditions.

1.13 ACCEPTABLE MANUFACTURERS – SUCTION DIFFUSERS

A. ITT Bell & Gossett.
B. Armstrong.
C. Domestic.
D. Taco.
E. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.14 SUCTION DIFFUSERS

A. Suction diffuser shall consist of angle type body with straightening vanes and combination diffuser-strainer-orifice cylinder with 3/16" diameter openings for pump protection; 175 psi working pressure at 250 degrees F. Similar to ITT Bell & Gossett Model No. JJ.

B. A permanent magnet shall be located within the flow stream and shall be removable for cleaning.

C. Steel orifice cylinder shall be equipped with a disposable bronze fine mesh strainer, which shall be removed after system start-up. Orifice cylinder shall be designed to withstand pressure differential equal to pump shutoff head and shall have a free area equal to five times cross section area of pump suction opening.

D. Steel straightening vanes shall extend the full length of the orifice cylinder and shall be replaceable.

E. Unit shall be provided with adjustable support foot to carry weight of suction piping; easily removable end cap with reusable o-ring; and a pressure gauge tapping to permit checking of system conditions.

1.15 ACCEPTABLE MANUFACTURERS – COMBINATION PUMP DISCHARGE VALVES

A. ITT Bell & Gossett.
B. Armstrong.
C. Domestic.
D. Taco.
E. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.16 COMBINATION PUMP DISCHARGE VALVES

A. Valves: straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psig operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem and spring, and calibrated adjustment permitting flow regulation. Valve design shall permit repacking under full system pressure.

B. Each valve shall be equipped with brass read-out valves with integral check valve for taking differential pressure readings.

1.17 ACCEPTABLE MANUFACTURERS – FLOW INDICATORS

A. ITT Bell & Gossett.
B. Armstrong.
C. Hoffman.
D. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.18 FLOW INDICATORS

Brass construction, threaded for insertion into piping system, packless, with paddle with removable segments, vapor proof electrical compartment with switches.

1.19 ACCEPTABLE MANUFACTURERS – FLOW CONTROLS

A. MCC Powers.

B. Honeywell.
C. Barber Colman.
D. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.20 FLOW CONTROLS

A. Construction: Brass or bronze body with union on inlet, temperature and pressure test plug on outlet.

B. Calibration: control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control.

C. Control Mechanism: stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave forming spring.

D. Accessories: in-line strainer on inlet and ball valve on outlet.

1.21 ACCEPTABLE MANUFACTURERS – FLOW METERS

A. MCC Powers.
B. Honeywell.
C. Barber Colman.
D. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.22 FLOW METERS

A. Cast iron, wafer type, orifice insert flow meter designed for low-pressure drop operation; similar to ITT Bell & Gossett Model OP. Flow meter shall be designed to operate at a maximum working pressure of 300 psig at 250 degrees F. Flow meter will be equipped with brass readout valves with integral check valves, for taking differential pressure readings across the orifice of the flow meter. The flow meter must be furnished with a calibrated nameplate for determining an accurate system flow rate.

B. Calibrated, plug type balance valve with precision machined orifice for 125 psig working pressure, readout valves equipped with integral check valves and gasketed caps, calibrated nameplate and indicating pointer.

C. Portable readout meter with provision for hanging, capable of indicating pressure differential across a system component. Unit to be complete with all necessary hoses, shut-off and vent valves, and carrying case; plus or minus 1.0 percent accuracy, with 0-35 feet pressure range, color coded hoses for low and high pressure connections, and connectors suitable for connection to read-out valves.

1.23 ACCEPTABLE MANUFACTURERS – RELIEF VALVES

A. ITT Bell & Gossett.
B. Zurn Industries.
C. Armstrong International.
D. Watts Regulator Company.
E. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

1.24 RELIEF VALVES

Bronze body, Teflon seat, stainless steel stem and springs, automatic, diaphragm-assist operation with fail-safe disc, direct pressure actuated, capacities ASME certified and labeled.

1.25 HEAT TRACING - NA

PART 3 - EXECUTION

3.01 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's recommendations.

B. Support tanks inside building from building structure in accordance with manufacturer's instructions. Submit details of support and obtain approval from Architect / Engineers – prior to proceeding.

C. Where large air quantities can accumulate, provide enlarged air collection standpipes.

D. Provide manual air vents at system high points and as indicated. Provide copper vent tubing, connect to vent and run to nearest drain, except as otherwise indicated.

E. Provide air separator on suction side of system circulation pump and connect to expansion tank.

F. Provide valved drain and hose connection on strainer blow down connections.

G. Provide pump suction fitting on suction side of base mounted centrifugal pumps. Remove temporary strainers after cleaning system.

H. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps.

I. Support pump fittings with floor mounted pipe and flange supports.

J. Provide radiator valves on water inlet to terminal heating units such as radiation, unit heaters, and fan coil units.

K. Provide radiator balancing valves on water outlet from terminal heating units.

L. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.

M. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

N. Pipe relief valve outlets to nearest floor drain.

O. Where one line vents several relief valves, make cross sectional area equal to the sum of individual vent areas.

P. Provide flow indication, control and metering capability as specified herein or shown on the drawings.

END OF SECTION 15515

SECTION 15535 - REFRIGERANT PIPING AND SPECIALTIES

PART 1 - GENERAL

1.01 WORK INCLUDED

The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of refrigerant piping and specialties shown on the contract drawings or specified herein.

1.02 REFERENCES

A. ANSI/ARI 495 – Refrigerant Liquid Receivers.
B. ANSI/ARI 710 – Liquid Line Dryers.
C. ANSI/ASHRAE 15 – Safety Code for Mechanical Refrigeration.
D. ANSI/ASHRAE 34 – Number Designation of Refrigerants.
E. ANSI/ASME Section 8D – Boiler and Pressure Vessels codes, Rules for Construction of Pressure Vessels.
F. ANSI/ASME Section 9 – Boiler and Pressure Vessels code, Welding and Brazing Qualifications.
G. ANSI/ASME B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
H. ANSI/ASME B16.26 – Cast Copper Alloy Fittings for Flared Copper Tubes.
I. ANSI/ASME B31.5 – Refrigerant Piping.
J. ANDI/ASME B31.9 – Building Services Piping.
K. ANSI/ASTM B32 – Solder Metal.
L. ANSI/ASTM B88 – Seamless Copper Water Tube.
M. ANSI/AWS A5.8 – Brazing Filler Metal.
N. ANSI/AWS D1.1 – Structural Welding Code, Steel.
O. ANSI/UL 429 – Electrically Operated Valves.
P. ARI 750 – Thermostatic Refrigerant Expansion Valves.
Q. ARI 760 – Solenoid Valves for Use with Volatile Refrigerant.
R. ASTM B280 – Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
S. MIL-I-631C – Construction at Solenoid Valve Coils.
T. MIL-V-23450C – Valves, Expansion, Thermostatic, Refrigerant 12 and Refrigerant 22.
U. ANSI/ASHRAE Standard 34 – Number Designation and Safety Classification of Refrigerants.
V. ANSI/ASHRAE 15 – Safety Code for Mechanical Refrigeration.
W. Clean Air Act.
X. Montreal Protocol.

1.03 SUBMITTALS

A. Submit shop drawings and product data under provisions of the Contract Documents that apply to the work of this section.

B. Submit data indicating pipe sizing.

C. Submit test reports indicating results of leak tests and acid tests.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installed. Insure that insulation remains dry and efficient throughout shipping, storage and installation.

PART 2 PRODUCTS

2.01 REFRIGERANT PIPING

A. Aboveground – Copper Tubing: ASTM B280, cleaned and sealed Type K ACR, hard drawn or annealed, for air conditioning and refrigeration service.

1. Fittings: ANSI/ASME B16.22 wrought copper.

2. Joints: ANSI/AWS A5.8 Bcup silver braze.

2.02 REFRIGERANT

In accordance with ANSI/ASHRAE 34.

2.03 MOISTURE AND LIQUID INDICATORS

Indicators: UL listed, with copper or brass body, flared ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; maximum working pressure of 500 psi, maximum temperature of 200 degrees F.

2.04 VALVES

A. Diaphragm packless valves: UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

B. Packed angle valves: forged brass, forged brass seal cap with copper gaskets, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.

C. Packed ball valves: two-piece forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plate ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.

2.05 STRAINERS

Straight line or angle type: brass or steel shell, steel cap and flange, and replaceable cartridge with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

2.06 CHECK VALVES

A. Globe Type: cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.

B. Straight Thru Type: brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 250 degrees F.

2.07 PRESSURE RELIEF VALVES

Straight Thru or Angle Type: brass body and disc, neoprene seat, factory sealed and stamped with ASME UV and National Board Certification VB; for standard 450 psi setting; selected to ANSI/ASHRAE 15.

2.08 FILTER DRYERS

A. Replaceable Cartridge Angle Type: ANSI/ARI 710, UL listed, brass shell and bronze cap, perforated brass shell and molded desiccant filter core; for maximum working pressure of 350 psi.

B. Permanent Straight Thru Type: ANSI/ARI 710, UL listed, steel shell with molded desiccant filter core, for maximum working pressure of 500 psi.

2.09 SOLENOID VALVES

A. Valve: ARI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly with flared, solder or threaded ends; for maximum working pressure of 500 psi. Stem shall permit manual operation in case of coil failure.

B. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, internal junction box; MIL-I-631C and ANSI/UL 429.

2.10 EXPANSION VALVES

A. Angle or Straight Thru Types: ARI 750 design suitable for refrigerant; brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer with capillary bulb and remote sensing bulb and remote bulb well.

B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degree F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.11 FLEXIBLE CONNECTIONS

Corrugated stainless steel or bronze hose with single layer of stainless steel exterior braiding, minimum nine inches long with copper tube ends; for maximum working pressure of 500 psi.

PART 3 EXECUTION

1.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install refrigeration specialties and safety equipment in accordance with manufacturer’s instructions and applicable standards and codes.

B. Provide non-conducting dielectric connections when joining dissimilar metals.

C. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

D. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

E. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

F. Fully charge completed system with refrigerant and oil after testing.

3.03 APPLICATION

A. Provide line size liquid indicators in main liquid line leaving condenser, or if receiver is provided, in liquid line leaving receiver.

B. Provide line size strainer upsteam of each automatic valve. Where multiple expansion valves with integral strainers are used, install single main liquid line strainer.

C. Provide shut-off valve on each side of strainer.

D. Provide replaceable cartridge filter-dryers vertically in liquid line adjacent to receivers with valve bypass assembly to permit isolation of dryers for servicing.

E. Provide solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control, in liquid line of single or multiple evaporator systems, and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

F. Provide refrigerant charging valve connections in liquid line between receiver shut-off valve and expansion valve.

G. Utilize flexible connectors at or near compressors where piping configuration does not absorb vibration.

H. All suction lines shall be insulated to prevent sweating and loss of refrigerating capacity. Liquid line does not require insulation.

3.04 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with ANSI/ASME B31.5.

B. Pressure test system with dry nitrogen to 200 psig. Perform final test at 27 inches vacuum and 200 psig using electronic leak detectors. Test to no leakage.

END OF SECTION 15535

SECTION 15575 - INSULATED METAL FLUE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of UL listed insulated metal flue and accessories shown on the contract drawings or specified herein.

B. The Contractor shall furnish and install a UL listed air tight flue system running from the existing boiler to the existing masonry chimney.

C. The factory built vent/chimney shall be composed of listed factory built components, assembled in accordance with the terms of listing, to form the completed chimney. The entire assembly shall be UL approved for 1400 degrees F. The assembly shall be tested and complete.

1.02 REFERENCES

A. ANSI/ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

B. ANSI Z181.1 – Medium Heat Appliance Factory Built Chimneys.

C. NFPA Standards.

D. ASHRAE – Handbook, Equipment Volume, Chapter – "Chimney, Gas, Vent and Fireplace Systems", latest edition.

E. SMACNA – HVAC Duct Construction Standards – Metal and Flexible.

F. UL Listed and Labeled.

1.03 DEFINITIONS

A. Breeching: vent connector.

B. Chimney: primarily vertical shaft enclosing at least one vent for conducting flue gasses outdoors.

C. Smoke Pipe: round, single wall vent connector.

D. Vent: that portion of a venting system designed to convey flue gasses directly outdoors form a vent connector or from an appliance when a vent connector is not used.

E. Vent connector: that part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.04 DESIGN REQUIREMENTS

A. Factory built vents, connectors and chimneys, used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

1.05 RELATED WORK

A. Section 15140 – Support and Anchors.

B. Refer to drawings.

C. Section 15190 – Mechanical Identification.

D. Section 15242 – Vibration Isolation and Seismic Restraints.

E. Section 15600 – Existing Boiler.

1.06 SUBMITTALS

A. Submit shop drawings indicating general construction, dimensions, weights, support and layout of breechings. Where factory built units are used, submit layout drawings indicating plan view and elevations.

B. Submit product date indicating factory built chimneys/vent including dimensional details of components and flue caps, dimensions and weights.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in the manufacture of products specified in this section with minimum five (5) years documented experience.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for installation of oil burning appliances and equipment.

B. Conform to applicable code for installation of gas burning appliances and equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – INSULATED METAL FLUE SYSTEM

A. Van-Packer Company.

B. Metalbestos.

C. MetalFab.

D. Cheminee Lining Inc.

E. Substitutions: under provisions of the Contract documents that apply to the work of this section.

2.02 INSULATED METAL FLUE

A. The Contractor shall furnish and install a UL listed airtight flue system, running from the existing boiler to the existing masonry chimney - similar to Metalbestos Model PS chimney. The entire assembly shall be UL approved for 1400 degrees F. The assembly shall be complete for safe and reliable operation.

B. The installation shall include provisions for adequate expansion, steel reinforcing as required for rigidity, adequate structural framing and supports attached to the building in a manner approved by the architect/engineer.

C. The inner gas carrying pipe shall be 316 stainless steel 0.035 inches thick, minimum. The outer jacket shall be 0.025 inch thick stainless steel surrounding a one inch air space.

D. Type 316 stainless steel multiple tap inner space bands shall maintain the one inch air space and restrict heat transfer to maintain UL tested performance.

E. Joints shall be sealed with Selkirk Metalbestos ceramic joint cement rated for 2000 degrees F.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with recommendations of ASHRAE – Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems", and ANSI and NFPA.

C. Coordinate the installation of the flue system with roof truss locations.

D. Install breeching with minimum joints. Align accurately at connections, with internal surface smooth.

E. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys and stacks at 12 foot spacing minimum (unless more stringent code restrictions apply), to adjacent structural surfaces. Refer to SMACNA HVAC Duct Construction Standards – Metal and Flexible, for equivalent duct support configuration and size.

F. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.

G. Coordinate installation of dampers.

H. Maintain UL and manufacturer's minimum clearances from combustibles.

I. Install vent dampers, locating close to draft hood collar, and secured to breeching

J. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing.

K. Level and plumb flue except as indicated.

L. Clean breechings, chimneys and stacks during installation; removing duct and debris.

M. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, chimneys or stacks.

N. Provide, supports and physical attachment to existing building.

END OF SECTION 15575

SECTION 15600 – EXISTING BOILER

PART 1 - GENERAL

1.01 WORK INCLUDED

The scope of the work includes converting the existing oil fired low pressure steam (LPS) boiler, currently used for space heating, to a natural gas fired unit capable of generating Hot Water also to be used for space heating.

All work shall be performed in strict accordance with the recommendations of the manufacturer of the existing boiler and new gas burner. The contractor shall confer with the respective manufacturers and pay for the services of a factory trained technician to visit the site and assist the contractor with start-up testing and re-certification of the boiler once converted.

According to name tags & published data: The existing boiler is an HB Smith model # 28A-9 cast iron sectional boiler fitted with a Carlin model # 1050FFD-20. The boiler is designed to meet ASME Boiler and Pressure Vessel Code, Section IV for a maximum allowable working pressure, steam 15 psig, water 80 psig.

According to manufacturer's data sheets the boiler is rated at 67 BHP and has a net IBR rating of 1733 MBH (steam), 1941 MBH (water) & a gross output of 2232 MBH.

The scope includes removing from the boiler; all steam supply piping and condensate return piping, the relief valve, as well as the boiler steel insulated jacket, all steam trim, all existing controls, the oil burner, oil piping, and all flue piping extending from the boiler to the existing masonry chimney.

The scope includes replacing all existing steam safety and operating controls with new safety and operating controls recommended by the boiler manufacturer for use on the subject boiler in the production of hot water. Provide a new ASME pressure relief valve as recommended by the boiler manufacturer. All boiler work shall be in strict accordance with the recommendations of the boiler manufacturer.

Replace the existing oil burner with a new burner designed to fire natural gas exclusively. The new burner shall be Power Flame model # C2-G-20B1 or approved equal. All new components shall be as recommended by the boiler & burner manufacturers respectively.

In addition - Provide new combustion air intake, galvanized steel open grate, galvanized steel combustion air intake sheetmetal duct riser, grills at ceiling & floor, new natural gas fuel branch piping extending from the from the new gas service provided by the plumbing contractor to the new burner, new 14" diameter stainless steel double wall insulated flue, new how water supply and return piping, HW piping trim. Refer to plans, details, diagrams, control sequences and technical specifications for additional requirements.

<u>Testing</u>

Once converted (from oil to gas & LPS to HW) and before putting the boiler into service the contractor shall test the completed assembly.

A hydrostatic test of the unit shall be performed at 1.5 times the manufacturer's published 80 psig allowable working pressure or 120 psig. The test shall be performed in the presence of an ASME certified boiler inspector and the local building official. The contractor shall provide to the Owner written certification confirming that the test was conducted successfully.

Once completed and with all components in place the contractor shall test all operating and safety controls. The test shall be performed in the presence of the local building official. The contractor shall provide to the Owner written certification confirming that the test was conducted successfully, and all safety and operating controls performed properly.

Work of Other Trades - Concrete Floor

The existing basement boiler room floor is in a state of disrepair. A new concrete floor is proposed for the basement where the boiler is currently located. The new floor is intended to pitch to new floor drains and accommodate extensive new under-floor plumbing drainage piping and a new sewage ejector.

In order to facilitate the installation of the new concrete floor in the basement, the contractor shall fully cooperate and coordinate with trades performing concrete work.

The scope includes disassembling, handling, storage, cleaning the mating surfaces of the cast iron sections, replacing all seals with new seals, and reassembling the cast iron boiler sections as required to facilitate the installation of the new basement floor.

Alternate

As an alternative to handling & converting the existing boiler from oil to gas and LPS to HW, the contractor may elect instead - to replace the existing boiler with a new HW boiler capable of meeting the performance of the existing boiler as indicated above. If the contractor elects to provide a new boiler in lieu of converting the existing boiler - the new boiler shall be an HB Smith model 28HE - 9 with the new burner specified above.

1.02 RELATED WORK

A. Section 15625 – Fuel System.
B. Section 15410 – Plumbing Piping.
C. Section 15980 – Instrumentation.

1.03 REFERENCES

A. American Society of Mechanical Engineers (ASME) Section IV – Boiler and Pressure Vessel Code.
B. ASME Section VI – Recommended Rules for the Care and Operation of Heating Boilers.
C. ANSI/ASME Section 8D – Boiler and Pressure Vessel Codes – Rules for Construction of Pressure Vessels.
D. Hydronics Institute (HI) – Testing and Rating Standard for Cast Iron and Steel Heating Boilers.
E. Institute of Boiler and Radiator Manufacturers (I=B=R).
F. NFPA, specifically NFPA 31 – Installation of Oil Burning Equipment.
G. ANSI/UL 726 – Oil Fired Boiler Assemblies.
H. Industrial Risk Insurers (IRI).
I. Underwriters Laboratories (UL), specifically UL 795 and UL 296.
J. American Society of Mechanical Engineers CSD-1 – Controls and Safety Devices for Automatically Fired Boilers.

1.04 REGULATORY REQUIREMENTS

A. I=B=R Compliance: provide a boiler that has been tested and rated in accordance with the Institute of Boiler and Radiator Manufacturers (I=B=R) “Testing and

Rating Standard for Cast Iron and Steel Heating Boilers", and bears the I=B=R emblem on a nameplate affixed to the boilers.

B. ASME Compliance: boiler constructed in accordance with ASME Boiler and Pressure Vessel Code, Section IV, "Heating Boilers".

C. UL and NEMA Compliance: provide boiler and ancillary electrical components which have been listed and labeled by UL and comply with NEMA standards.

D. NFPA 31 Compliance: the completed installation shall comply with the current NFPA 31 code related to the installation of oil burners.

E. Department of Labor Regulations and Safety Standards for Boilers.

1.05 SUBMITTALS

Submit shop drawings and product data for manufactured products and assemblies under provisions of the Contract documents that apply to the work of this section.

1.06 OPERATION AND MAINTENANCE

Submit operation and maintenance data under provisions of the Contract documents that apply to the work of this section. Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

1.07 QUALITY ASSURANCE

Manufacturer: company specializing in manufacturing the product specified in this section with minimum ten (10) years documented experience.

1.08 DELIVERY, STORAGE AND HANDLING

Deliver and store products under provisions of the Contract documents that apply to the work of this section. Protect units before, during and after installation from damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS – BOILER/BURNER UNITS. NA

2.02 EXISTING BOILER

A. Refer to drawing s

B. Notify the State Boiler Inspector when the installation of the Boiler, Burner, Controls and system piping is substantially complete. Request an inspection by State Boiler Inspector and obtain a Certificate of Inspection upon satisfactory completion of tests.

PART 3 EXECUTION

3.01 INSTALLATION

A. Note - access to the existing Boiler Room is limited.

B. Install and test in accordance with manufacturer's instructions. Thoroughly clean the boiler internally, as prescribed in Section VI of the ASME Boiler and Pressure Vessel Code.

C. Arrange to have a factory trained representative of the manufacturer start the boiler-burner unit. Start up shall check all limits, safety devices and controls. The units shall be set for optimum efficiency and a report shall be made to the contractor and Owner's representative.

D. Provide installation and operation manuals, and with the assistance of a factory trained technician, instruct authorized representatives of the Owner in the proper operation of the boiler.

E. Prior to requesting final acceptance of the boiler - check and test all operating and safety controls, and upon completion of satisfactory tests – provide written certification confirming proper operation of all operating and safety controls - to the Owner.

END OF SECTION 15600

SECTION 15890 - DUCTWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall provide all labor, materials, tools, equipment, accessories, and perform all operations and services required for complete installation of safe, reliable, and operable sheet metal ductwork for the air distribution systems shown on the contract drawings or specified herein.

1.02 RELATED SECTIONS

A. Section 15910 – Ductwork Accessories.
B. Section 15936 – Air Inlets, Outlets and Louvers.
C. Section 15990 – Testing, Adjusting and Balancing.

1.03 SUPPLEMENTAL REFERENCES

A. ASHRAE – Handbook 2001 Fundamentals; Chapter – Duct Design.
B. ASHRAE – Handbook 2000 – HVAC Systems and Equipment; Chapter – Duct Construction.
C. ASTM A90 – Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
D. ASTM A167 – Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
E. ASTM A525 – General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
F. ASTM A527 – Steel sheet, Zinc Coated (Galvanized) by Hot Dip Process, Lock Forming Quality.
G. ASTM B209 – Aluminum and Aluminum Alloy Sheet and Plate.
H. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.
I. NFPA 90B – Installation of Warm Air Heating and Air Conditioning Systems.
J. NFPA 96 – Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
K. NFPA 17A – Fire Suppression Systems.
L. SMACNA – Duct Construction Standards, latest edition.
M. SMACNA – HVAC Air Duct Leakage Classification.
N. UL 181 – Factory-Made Air Ducts and Connectors.
O. NADCA Mechanical Cleaning of Non-Porous Air Conveyance System Components.

1.04 DEFINITIONS AND DESIGN STANDARDS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.

B. All sheetmetal ductwork - located outside, on the roof, or otherwise exposed to weather - shall be constructed entirely with WATERTIGHT JOINTS in strict accordance with SMACNA Standards, and the requirements of ASHRAE.

C. Duct Construction Standards: Unless otherwise indicated, all ductwork shall be constructed in accordance with, and meet strength and rigidity requirements of SMACNA Pressure Class 4” w.g., 4000 FPM.

D. All fresh air intake ductwork shall be Type 316 stainless steel.

E. All ductwork for kitchen exhaust systems shall be constructed of continuously welded liquid-tight stainless steel to meet the requirements of NFPA 96 standards.

F. All ductwork located in machine rooms shall be sealed in strict accordance with SMACNA Seal Class A for ducts passing through a machine room with a mechanical refrigeration system.

G. All sheet metal ductwork for air distribution shall be furnished, installed, tested and balanced in accordance with current SMACNA standards.

H. All ductwork shall be constructed of prime, first-quality zinc-coated steel, except where otherwise noted.

I. Additional reinforcing to prevent buckling, breathing, vibration or unnecessary noise shall be provided to meet job conditions, as directed by the Engineer.

1.05 SUBMITTALS

Submit shop drawings and product data under provisions of the Contract documents that apply to the work of this section. The Contractor shall coordinate space requirements with other trades before submitting shop drawings for approval.

1.06 DELIVERY, STORAGE AND HANDLING

Deliver products to site under provisions of the Contact Documents that apply to the work in this section. Store and protect products under provisions of the Contract documents that apply to the work of this section.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.

B. Steel ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per square foot for each side in conformance with ASTM A90.

C. Stainless Steel Ducts: ASTM A167, Type 316.

D. Flexible Ducts: Interlocking spiral of galvanized steel or aluminum construction or fabric supported by helically wound spring steel wire or flat steel bands; rated to 2 inches WG positive and 1.5 inches WG negative for low pressure ducts.

E. Fasteners: Rivets, bolts, or sheet metal screws.

F. Sealant (Except Kitchen Hood Exhaust Ductwork): Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape or heavy mastic.

G. Hanger Rod (Except Kitchen Hood Exhaust Ductwork): steel; galvanized; threaded both ends, threaded one end, or continuously threaded.

H. Hanger Rod (Kitchen Hood Exhaust Ductwork): Stainless steel; threaded both ends, threaded one end, or hangers per NFPA.

2.02 HIGH PRESSURE DUCTS

A. Fabricate and support in accordance with SMACNA 4" w.g., 4000 FPM Duct Construction Standards and ASHRAE handbooks. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

B. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is required, provide turning vanes with perforated metal with glass fiber insulation. Weld in place.

C. Transform duct sizes gradually, not exceeding 15-degree divergence and 30 degree convergence.

D. Fabricate continuously welded medium and high pressure round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum 4-inch cemented slip joint, brazed or electrical welded. Prime coat welded joints.

E. Provide standard 45-degree lateral wye takeoffs unless otherwise indicated where 90-degree conical tee connections may be used.

2.03 PLENUMS AND CASINGS

A. Fabricate casings in accordance with SMACNA High Pressure Duct Construction Standards and construct for operating pressures indicated.

B. Mount floor mounted casings on four-inch high concrete curbs. At floor, rivet panels on eight-inch centers to angles. Where floors are acoustically insulated, provide liner of 18 gauge galvanized expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.

C. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or require for access to equipment for cleaning and inspections.

D. Fabricate acoustic casings with reinforcing turned inward. Provide 16-gauge back facing and 22 gauge perforated front facing with 3/32 inch diameter holes on 5/32 inch centers. Construct panels three inches thick packed with 4.5 pound/cubic foot minimum glass fiber media, on inverted channels of 16 gauge.

2.04 FLEXIBLE DUCT

Flexible duct is not permitted unless specifically indicated on the drawings.

2.05 HIGH PRESSURE LIQUID TIGHT (KITCHEN HOOD EXHAUST) DUCTWORK

Fabricate in strict accordance with SMACNA High Pressure Duct Construction Standards and NPA 96 requirements. Construct of 18 gauge, type 316 stainless steel, using liquid-tight continuous external welding joints, seams and penetrations.

PART 3 - EXECUTION

3.01 INSTALLATION

The contractor shall be solely responsible for the proper fit and arrangement of sheet metal work and other related components of his work and for maintaining clearances and maximum headroom.

A. All ductwork shall be supported from building structure by steel hangers and supports provided by the Contractor, in accordance with SMACNA standards.

B. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities. Ductwork shall be installed so that there is clearance of at least one inch between finished covering of ductwork and adjoining work.

C. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

D. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

E. Install prefabricated round insulated ductwork in strict accordance with manufacturer's instructions and SMACNA standards.

3.02 KITCHEN HOOD EXHAUST - NA

3.03 DUCTWORK MATERIAL - APPLICATION BY SYSTEM

SYSTEM	MATERIAL
Supply and Return	Galvanized Steel
Exhaust - General, Machine Room and Toilet	Galvanized Steel
Fresh Air Intake	Galvanized Steel
Combustion Air	Stainless Steel
Intake and Exhaust Plenums	Galvanized Steel

3.04 TESTING, ADJUSTING AND CLEANING

A. The Contractor shall not permanently close up, fir-in or cover ductwork before examination and testing.

B. Clean galvanized duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment, which may be harmed by excessive dirt, with temporary filters or by pass during cleaning.

C. The contractor shall balance the air distribution systems in accordance with the procedures described by SMACNA, to achieve the air flows indicated on the drawings. Prepare written air balance report.

END OF SECTION 15890

SECTION 15910 - DUCTWORK ACCESSORIES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation ductwork accessories, as shown on the contract drawings or specified herein.
B. Volume control dampers.
C. Fire Dampers.
D. Combination smoke/fire dampers.
E. Smoke dampers.
F. Counter-balanced back-draft dampers.
G. Air turning devices.
H. Duct access doors.
I. Flex Duct Connections.

1.02 RELATED SECTIONS

A. Section 15870 – Exhaust, Ventilating and Return Fans.
B. Section 15910 – Ductwork Accessories.
C. Section 15936 – Air Inlets, Outlets and Louvers.

1.03 SUPPLEMENTAL REFERENCES

A. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.
B. SMACNA – Duct Construction Standards.
C. UL 33 – Heat Responsive Links for Fire-Protection Service.
D. UL 555 and 555S–Fire Dampers, Combination Fire and Smoke Dampers and Ceilings Dampers.
E. NFPA 96 – Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment.

1.04 SUBMITTALS

Submit shop drawings and product data under provisions of the Contract Documents that apply to the work of this section.

PART 2 – PRODUCTS

2.01 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA Duct Construction Standards.

B. Low leakage control damper shall include sturdy steel construction, with interlocking frame design. Damper shall lock together without bolts, screws or rivets. Frame corners shall be internally braced to reduce racking.

C. Axles shall positively lock to blades without screws or welds. Non-stick non-corrosive bearings shall be provided.

D. Damper shall be tested in accordance with AMCA Standard 500.

E. Construction:

1. Frame: 16 gauge galvanized steel with corner braces.
2. Blades: 6” wide, 16 gauge galvanized steel blades, approximately 6” on center. Parallel action.

3. Seals: suitable for –50 degree to +250 degree F. Jamb shall be flexible metal, compression type; high efficiency.
4. Bearings: synthetic.
5. Linkage: exposed.
6. Axles: ½" plated steel hex.
7. Control Shaft: 6" x ½" diameter with outboard support bearing for field mounted operators.
8. Finish: mill galvanized.

2.02 ACCEPTABLE MANUFACTURERS – FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS

A. Ruskin, Prefco, Greenheck.

2.03 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated

B. Fabricate ceiling firestop flaps of galvanized steel, 22 gauge frame and 16 gauge flap, two layers 0.125 inch ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip.

C. Fabricate ceiling dampers of galvanized steel, 22 gauge frame, stainless steel closure spring, and light weight, heat retardant non-asbestos fabric blanket closure.

D. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for low pressure ducts up to 12 inches in height.

E. Fabricate multiple blade fire dampers with 16 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x ½ inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

F. Fusible links, UL 33, shall separate at 160 degrees F, unless otherwise indicated. Provide adjustable link straps for combination fire/balancing dampers.

A. 2.04

2.01 COUNTER-BALANCED BACKDRAFT DAMPERS

A. Gravity backdraft dampers, sized 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturer's standard construction.

B. Fabricated multi-blade parallel action gravity balanced backdraft damper of 16 gauge galvanized steel with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device shall permit setting for varying differential static pressure.

2.02 FLEXIBLE DUCT CONNECTIONS

Fabricate in accordance with SMACNA Duct Construction Standards, and as indicated. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 36 oz per square yard, approximately 6 inches wide, crimped into metal edging strip. Leaded vinyl sheet, minimum 0.55 inch thick, 0.87 pounds per square foot,

10 dB attenuation in 10 to 10,000 Hz range. Flexible duct connections shall be permissible only where indicated on the drawings.

2.03 DUCT ACCESS DOORS – GALVANIZED STEEL

A. Access doors shall be installed in ducts at all fire dampers, control dampers, etc., and as indicated on the drawings.

B. Furnish and install in medium or high pressure ductwork, a high pressure duct access door of suitable size and location so fire dampers can be conveniently inspected, tested and reset, or as indicated on the drawings. Access doors for medium and high pressure duct systems shall be rated by their manufacturer's published literature for installation in systems with pressures up to 12 inch w.g. Access doors shall be Ruskin ADHP-3 or approved equal. Frame shall be 16 gauge galvanized steel with reinforced corners. Insulated door shall be formed of 16 gauge galvanized steel. Gasket shall be polyurethane foam. Latch shall be spring return.

C. Furnish and install in low pressure ductwork, a standard duct access door of suitable size and location, as indicated on the drawings. Access doors for low pressure ductwork shall be rated by their manufacturer's published literature for installation in systems with pressures up to 3 inch w.g. for sizes through 12" x 12", and 2 inch w.g. for sizes above 12" x 12". Access doors shall be Ruskin ADH, or approved equal. Doors shall be hinged type, double skin with continuous piano type hinge, 22 gauge galvanized steel frame and door, with two locks. Seal shall be foam gasket. Insulation shall be 1" fiberglass.

D. The rating of access doors shall be consistent with the rating of respective construction pierced by the access door.

E. Install units in strict accordance with manufacturer's instructions, with frames plumb and level in opening. Secure rigidly in place. Position unit to provide convenient access to concealed work requiring access.

2.04 MANUAL CONTROL DAMPERS

A. Splitter dampers and volume dampers shall be installed inducts where shown on the drawings.

B. Volume dampers shall be opposed blade type with locking-type hand quadrant, as manufactured by Ruskin Mfg. Co., or engineer approved equal. Hand quadrant position shall be marked after final balancing.

C. Splitter dampers shall be controlled by means of a rod extending through the side of the duct. The rod shall be securely fastened to the duct to eliminate rod movement in any direction. The rod shall be notched to indicate damper position after final balancing.

2.05 MOTOR OPERATED CONTROL DAMPERS

A. Control dampers shall be low leakage galvanized steel Ruskin Type CD36, or engineer approved equal.

B. Frame shall be 16 gage galvanized steel structural hat channel construction with tabbed corners for reinforcement.

C. Blades shall be single skin, 16 gage galvanized steel with three longitudinal grooves for reinforcement. Blades shall be six inches (6") wide, 16 gauge galvanized steel, approximately 6" on center. Finish shall be mill galvanized.

D. Blade edge seals shall be PVC coated polyester fabric suitable for -25°F to +180°F mechanically locked into the blade edge. Adhesive or clip-on type seals are unacceptable. Jamb seals shall be flexible meter, compression type to prevent leakage between blade end and damper frame. Blade end overlapping frame is unacceptable.

E. Bearings shall be corrosion resistant, molded synthetic sleeve type turning in an extruded hole in the damper frame. Axels shall be hexagonal positively locked into the damper blade. Linkage shall be concealed out of air stream, within the damper frame to reduce pressure drop and noise.

F. Control shaft shall be ½" diameter supplied with outboard shaft support bracket on single section dampers and jackshaft on multiple section dampers.

G. Where multiple section assemblies are provided, provide bracing to support assembly weight and to hold against system pressure.

H. Provide factory installed electric operators for automatic damper operation. Frame mounted operator bracket shall be provided. Refer to the sequence of control indicated in the drawings. Provide manufacturer's factory installed damper position indication switch package to remotely indicate damper blade position; Ruskin Model SP-100.

I. Submittal shall include leakage, pressure drop, maximum velocity and maximum pressure data based on AMCA Publication 500.

PART 3 -EXECUTION

3.01 INSTALLATION – DUCTWORK

A. Install accessories in accordance with manufacturer's instructions.

B. Provide balancing dampers at points on supply, return and exhaust duct systems where branches are taken from larger ducts or as required for air balancing. Use splitter dampers only where indicated.

C. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction.

D. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment, as indicated on the drawings.

E. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 12" x 12" size for hand access, 18" x 18" size for shoulder access, and as indicated.

END OF SECTION 15910

SECTION 15936 - AIR INLETS, OUTLETS, LOUVERS AND DAMPERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation air outlets, inlets and louvers, as shown on the contract drawings or specified herein.
B. Registers, grilles and diffusers.
C. Opposed Blade Dampers.
D. Equalizing Grids.
E. Louvers.
F. Motorized Dampers.

1.02 RELATED SECTIONS

A. Section 15140 – Supports and Anchors.
B. Section 15190 – Mechanical Identification.
C. Section 15242 – Vibration Isolation and Seismic Restraints.
D. Section 15687 – Rooftop Packaged Air Conditioners.
E. Section 15835 – Terminal Heat Transfer Units.
F. Section 15855 – Central Station Air Handling Unit.
G. Section 15870 – Exhaust, Ventilating and Return Fans.
H. Section 15890/910 –Ductwork and Ductwork Accessories.
I. Section 15990 – Testing, Adjusting and Balancing.

1.03 REFERENCES

A. ADC 1062 – Certification, Rating and Test Manual.
B. AMCA 500 – Test Method of Louvers, Dampers and Shutters.
C. ANSI/NFPA 90A – Installation of Air Conditioning and Ventilating Equipment.
D. ARI 650 – Air Outlets and Inlets.
E. ASHRAE 70 – Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
F. SMACNA – Sheet Metal and Air Conditioning Contractors' National Association Standards.

1.04 QUALITY ASSURANCE

1.05 A, Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70. B. Test and rate performance of louvers in accordance with AMCA 500.

1.06 SUBMITTALS

Submit product data under provisions of the Contract Documents that apply to the work of this section. Provide product data for items required for this project. Submit schedule of outlets and inlets indicating type, size, location, application, and noise level. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedule of outlets in inlets.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – DIFFUSERS, GRILLS AND REGISTERS

Titus, Nailor Industries, Inc, Air Balance, Tuttle and Bailey, Metal Industries, Inc., Price Industries.

2.02 DIFFUSERS, GRILLS AND REGISTERS

A. All grilles, registers and diffusers shall be selected for a maximum noise rating of NC-30, unless otherwise indicated.

B. All registers, grilles and diffusers shall be provided with opposed blade dampers, air extractors, and equalizing grids.

C. Refer to Schedule on Contract Drawings for types, sizes and applications.

2.03 ACCEPTABLE MANUFACTURERS - LOUVERS

Louvers & Dampers, Inc., Ruskin, Greenheck.

2.04 LOUVERS

A. Extruded Aluminum

1. Stationary type with blades contained within a six inch (6") frame, similar to Ruskin Model ELF6811. Louver frame construction shall be 6063, 0.125" extruded aluminum alloy frame with integral caulking slots. Blades shall be 6063, 0.125" extruded aluminum at 45 degree angle on approximately 6" centers, weatherproof (J) design. Blade length shall not exceed three feet. Visible mullion shall be provided when required. Furnish louver with interior angle flange.

2. Extruded aluminum louver shall receive a clear anodized finish complying with Aluminum Association Code AA-C22A41. Finish shall be applied to chemically etched and pretreated aluminum to 0.7 mils minimum surface depth by a 60 minute anodizing process. Finish is subject to Architect's approval.

3. ¾" x 0.051" aluminum birdscreen shall be provided. Screen shall be contained within a removable frame.

B. All louver components (head, jambs, sills, blades and mullions) shall be factory assembled by louver manufacturer. Louver design shall incorporate structural supports required.

C. Louver color shall be from the manufacturer's standard color chart and shall be subject to the Architect's review and approval.

D. Louvers shall meet free area, air flow and pressure drop requirements indicated on the Contract Drawings.

E. Provide louvers with flanges frame and extended sills where indicated on the drawings.

2.05 MOTORIZED CONTROL DAMPERS

A. Control dampers shall be low leakage galvanized steel Ruskin Type CD36, or engineer approved equal.

B. Frame shall be 16 gage galvanized steel structural hat channel construction with tabbed corners for reinforcement.

C. Blades shall be single skin, 16 gage galvanized steel with three longitudinal grooves for reinforcement. Blades shall be six inches (6") wide, 16 gauge galvanized steel, approximately 6" on center. Finish shall be mill galvanized.

D. Blade edge seals shall be PVC coated polyester fabric suitable for -25°F to +180°F mechanically locked into the blade edge. Adhesive or clip-on type seals are unacceptable. Jamb seals shall be flexible meter, compression type to prevent leakage between blade end and damper frame. Blade end overlapping frame is unacceptable.

E. Bearings shall be corrosion resistant, molded synthetic sleeve type turning in an extruded hole in the damper frame. Axels shall be hexagonal positively locked into the damper blade. Linkage shall be concealed out of air stream, within the damper frame to reduce pressure drop and noise.

F. Control shaft shall be ½" diameter supplied with outboard shaft support bracket on single section dampers and jackshaft on multiple section dampers.

G. Where multiple section assemblies are provided, provide bracing to support assembly weight and to hold against system pressure.

H. Provide factory installed electric operators for automatic damper operation. Frame mounted operator bracket shall be provided. Refer to the sequence of control indicated in the drawings. Provide manufacturer's factory installed damper position indication switch package to remotely indicate damper blade position; Ruskin Model SP-100.

I. Submittal shall include leakage, pressure drop, maximum velocity and maximum pressure data based on AMCA Publication 500.

PART 3 -EXECUTION

3.01 INSTALLATION

A. Install items in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille or register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

F. Provide access doors to allow for cleaning of all louvers and screens.

G. On outside air louvers, provide birdscreen where flow is forced, and insect screens where flow is gravity.

H. Provide motorized dampers on all louvers. Refer to contract drawings for details.

I. Install control dampers square and free from racking. Install actuator on linkage side. Follow manufacturer's instruction for in-duct mounting of control dampers.

J. Where multiple section control damper assemblies are provided, provide bracing to support assembly weight and to hold against system pressure.

END OF SECTION 15936

SECTION 15975 - TEMPERATURE CONTROLS SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

Provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of new Micro-Processor Based Automatic Temperature Controls System, as shown on the contract drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 15510/15 – Hydronic Piping and Hydronic Specialties.
B. Section 15980 – Instrumentation.

1.03 REFERENCES

ASHRAE 85 – Automatic Control Terminology for Heating, Ventilating and Air Conditioning. ASME MC-85.1 – Terminology for Automatic Control.

1.04 SYSTEM DESCRIPTION

A. Refer to the contract Drawings for Sequences of Control. The new Automatic Temperature Controls System must be capable of achieving the specified sequences of control. System shall provide all sensing, indicating, alarm and control functions indicated on the drawings.

B. Central and remote hardware, software, and interconnecting wire and conduit.

C. Control, sensing, signaling and operating devices.

D. All alarm functions shall energize an audible and visual alarm on computer and printer and shall have the capability to send an alarm signal to a remote central alarm receiving station through an integral system modem.

E. A local uninterruptible power supply (UPS) for the computer and dial-out modem shall be provided to enable the transmission of an alarm signal to remote location[s] in the event of a loss of commercial power.

1.05 SUBMITTALS

Submit under provisions of the Contract Documents that apply to the work in this section.

1.06 OPERATION AND MAINTENANCE DATA

Submit under provisions of the Contract Documents that apply to the work of this section.

1.07 QUALIFICATIONS

Manufacturer and installer: one company specializing in manufacturing and installation of the products specified in this section with minimum ten years documented experience. Design system software under direct supervision of a Professional Engineer experienced in design of this work and licensed in the state where the work shall be performed.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Automated Logic.
B. Andover Controls Corporation.
C. Landis Gyr Powers.
D. Barber Colman.
E. Johnson Controls.

F. Honeywell.

G. Substitutions: Under provisions of the Contract Documents that apply to the work in this section.

2.02 BASIC OPERATING FEATURES

A. Binary Capabilities:

1. Monitor binary sensors, continuously storing present contact condition in memory.

2. Indicate if point is off-normal, in alarm or off-line.

3. Program output points for Open/Closed, Test/Reset, Start/Stop.

4. Feedback Start/Stop points: employ point unique, feedback delay timer to temporarily suppress alarm reporting after input to allow time for response.

5. Output advisory message if response is not as commanded.

6. Hold points in present operating condition if controls power failure occurs.

B. Analog Capabilities:

1. Measure, transduce, transmit and display analog values.

2. Express analog point values in proper engineering units, displaying with up to six significant digits.

3. Have sensor to readout accuracy of plus or minus one degree F.

4. Use English system of measurement.

5. Provide for operator designated ranges either linear, series of linear approximations, split ranges, or square root extractions of exponential functions.

6. Compare analog read to high and low limits, and annunciate Alarm or Off-Normal condition.

7. Output alarm, including point identification current value and associated engineering units, high or low value, and time and date.

8. Automatically disable alarm reporting upon associated system shutdown. Allow sufficient time to return to normal operating conditions before allowing alarm reporting.

9. Provide limit and differential summary.

C. Analog Point Adjust:

1. Remotely adjust controller set points or dampers. Automatically adjust points based upon preselected time or value.

2. Employ feedback so that if point fails to respond, responds with wrong value, or drifts from set point value by plus or minus 2 percent, output alarm message appears. Employ feedback delay timer to temporarily suppress alarm reporting after input to allow time for response.

3. Hold points in present operating condition if controls power failure occurs.

D. Automatic Alarm Lockout: automatically inhibit alarm reporting of analog and binary points upon associated system shutdown. Inhibit reporting for operator predetermined time, upon restart of HVAC systems.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All wall-mounted controls shall be enclosed in a vandalproof clear locking cover.

C. Install electrical work in accordance with electrical specifications. Material and installation shall be in accordance with appropriate requirements of Division 16.

3.02 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems under provisions of the Contract Documents that apply to the work of this section.

B. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

C. Provide service engineer to instruct Owner's representatives in operation of systems plant and equipment for a maximum of three days.

D. Provide basic operator training for four persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 16 hours of dedicated instructor time.

3.03 DEMONSTRATIONS

Demonstrate complete and operating system to owner.

END OF SECTION 15975

SECTION 15980 - INSTRUMENTATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required for complete installation of instrumentation and accessories shown on the contract drawings or specified herein

B. Pressure gauges and pressure gauge taps.

C. Thermometers and thermometer well.

1.02 RELATED SECTIONS

A. Section 15242 – Vibration Isolation and Seismic Restraints.
B. Section 15250 – Mechanical Insulation.
C. Section 15510/15 – Hydronic Piping and Specialties.
D. Section 15535 – Refrigerant Piping.
E. Section 15540 – HVAC Pumps.
F. Section 15600 – Boilers.
G. Section 15855 – Air Handling Units.
H. Section 15870 – Exhaust, Ventilating and Return Fans.
I. Section 15890/910 – Ductwork and Accessories.
J. Section 15975 – Control System.
K. Section 15985 – Sequences of Control.

1.03 SUBMITTALS

A. Submit under provisions of the Contract documents.

B. Product Data: include list, which indicates use, operating range, total range and location for manufactured components.

1.04 PROJECT RECORD DOCUMENTS

Submit documents under provisions of the Contract documents that apply to the work of this section.

1.05 ENVIRONMENTAL REQUIREMENTS

Do not install instrumentation when area are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Weiss, Wecksler, Ashcroft

B. Substitutions: under provisions of the Contract documents.

2.02 PRESSURE GAGES

A. ASME B40.1, 2 inch diameter drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background, on percent mid-scale accuracy, scale calibrated in psi.

B. AMSE B40.1, 3-1/2 inch diameter cast aluminum case, phosphor bronze bourdon tube, rotary brass movement, brass socket, front recalibration adjustment, black

figures on white background, one percent mid-scale accuracy, scale calibrated in psi.

C. Magnehelic differential pressure indicating transmitter: Dwyer series 605, 5-1/2 inch, to provide visual monitoring (dial gage) and electronic control differential pressure (two-wire 4-20mA output). Unit shall operate to 25 psig maximum pressure; die-cast aluminum case with baked hammerloid finish, acrylic cover; protected potentiometers; 1/8" NPT female high and low pressure taps; complete with span and zero adjustment tool and mounting hardware; power supply 12 to 35 VDC.

D. Photohelic differential pressure switch/gage: Dwyer series 3000, 5-1/2 inch, to provide visual (dial gage) and switch setpoint indicator[s] for continuous indication of applied pressure and switch settings. Units shall be diaphragm operated with switching accomplished by photocell controlled relays. Setpoint adjustment shall be controlled by knobs. Unit shall be rated for 25 psig total pressure on either side of diaphragm. 1/8" NPT gage connection; brass case; 110 volt power connection.

2.03 PRESSURE GAGE TAPS

A. Gage cock: tee or lever handle, brass for maximum 150 psig.
B. Needle Valve: brass for maximum 125 psig.
C. Pulsation Damper: pressure snubber, brass with ¼ inch connection.
D. Siphon: stainless steel, angle or straight pattern.

2.04 STEM TYPE THERMOMETERS

A. ASTM E1, 7 inch scale, red appearing mercury, lens front tube, cast aluminum case with enamel finish and clear glass or polycarbonate window, 6 inch minimum in fluid stem brass stem, 2 percent of scale accuracy to ASTM E77, scale calibrated in degrees F.

B. ASTM E1, 7 inch scale, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish and clear Lexan window, 6 inch minimum in fluid stream brass stem, cast aluminum adjustable joint with positive locking device, 2 percent of scale accuracy to ASTM E77, scale calibrated in degrees F.

2.05 DIAL THERMOMETERS

A. ASTM E1, 2 inch diameter dial in stainless steel case, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed Lexan lens, stainless steel stem, one percent of full scale accuracy, calibrated in degrees F.

B. ASTM E1, 3 inch diameter dial in stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed Lexan lens, stainless steel stem, one percent of full scale accuracy.

C. ASTM E1, 2-1/2 inch diameter dial in stainless steel case, vapor or liquid actuated with brass or copper bulb, copper or bronze braided capillary, with black markings and black pointer glass lens, 2 percent mid-scale accuracy, calibrated in degrees F.

2.06 THERMOMETER SUPPORTS

A. Socket: brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.07 TEST PLUGS

A. Test Plug: ¼ inch or ½ inch stainless steel fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.

B. Test Kit: carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gage, one gage adapter with 1/8 inch probes, two one inch dial thermometers.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.

C. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.

D. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gage. Provide siphon on gages in steam systems.

E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2" for installation of thermometer sockets.

F. Install thermometer sockets adjacent to control system thermostat, transmitter or sensor sockets.

G. Coil and conceal excess capillary on remote element instruments.

H. Provide instruments with scale ranges selected according to service with largest appropriate scale.

I. Install gages and thermometers in locations where they are easily read from normal operating level.

J. Locate test plugs adjacent to thermometers and thermometer sockets, adjacent to pressure gages and pressure gage taps and adjacent to control device sockets.

END OF SECTION 15980

SECTION 15985 - SEQUENCE OF OPERATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required to achieve the sequences of control shown on the contract drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 15540 – HVAC Pumps.
B. Section 15687 – Rooftop Packaged Air Conditioners.
C. Section 15835 – Terminal Heat Transfer Units.
D. Section 15855 –Air Handling Units.
E. Section 15870 – Exhaust and Ventilating Fans.
F. Section 15975 – Control System.

1.03 SYSTEM DESCRIPTION

Equipment, devices and system components required for control systems and control sequences are specified on the Contract Drawings.

1.04 SUBMITTALS

A. Submit under provisions of the Contract documents that apply to the work of this section. Submit diagrams indicating mechanical system controlled and control system components. Label with settings, adjustable range of control and limits. Include written description of control sequences.

B. Include flow diagrams for each control system, graphically depicting control logic. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

1.05 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of the Contract documents that apply to the work of this section.

B. Accurately record actual setpoints and settings of controls, including changes to sequences made after submission of shop drawings.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 SEQUENCES OF CONTROL

Refer to Contract Drawings

END OF SECTION 15985

SECTION 15990 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The contractor shall provide all labor, materials, tools, equipment and services, and perform all operations required to complete testing, adjusting, and balancing of hydronic and air systems, to flow values indicated on the contract Drawings.

B. Measurement of final operating condition of HVAC systems.

1.02 RELATED SECTIONS

A. Section 15510/15 – Hydronic Piping and Specialties.

B. Section 15535 – Refrigerant Piping.

C. Section 15890/910 – Ductwork and Ductwork Accessories.

D. Section 15975 –Digital Control System

1.03 SUPPLEMENTAL REFERENCES

A. AABC – National Standards for Field Measurement and Instrumentation, Total System Balancing.

B. ASHRAE – 1999 HVAC Applications Handbook: Chapter, Testing, Adjusting and Balancing.

C. NEBB – Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.04 SUBMITTALS

A. Submit name of adjusting and balancing agency for approval within sixty (60) days after award of Contract.

B. Submit test reports as a submittal under provisions of the Contract documents that apply to the work in this section.

C. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.

D. Provide reports in soft cover, letter size, 3-ring binder complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

E. Include detailed procedures, agenda, sample report forms, and copy of AABC National Project Performance Guarantee prior to commencing system balance.

1.05 QUALITY ASSURANCE

Company specializing in the adjusting and balancing of systems specified in this section with minimum five (5) years documented experience certified by AABC. Perform work under supervision of registered Professional Engineer. Total system balance shall be performed in accordance with HVAC System & Applications handbook, latest edition.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before commencing work, verify that systems are complete and operable. Ensure the following:

1. Equipment is operable and in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are free of debris.
6. Correct fan rotation.
7. Fire and volume dampers are in place and open.
8. Coil fins shave been cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage has been minimized.
12. Hydronic systems have been flushed, filled, and vented.
13. Correct pump rotation.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Report any defects or deficiencies noted during performance of services to Engineer.

C. Promptly report abnormal conditions in mechanical systems or conditions, which prevent system balance.

3.02 PREPARATIONS

Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Engineer to facilitate spot checks during testing.

3.03 INSTALLATION TOLERANCES

A. Adjust air handling systems to plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

B. Adjust hydronic systems to plus or minus 10 percent of design conditions indicated.

3.04 ADJUSTING

A. Adjust work under provisions of the Contract documents that apply to the work in this section.

B. Record data shall represent actual measured or observed conditions.

C. Permanently mark settings of valves, dampers and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave system in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by owner.

G. Check and adjust systems approximately six months after final acceptance and submit report.

3.05 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated flow balancing devices installed per contract, Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution system by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less then total flow requirements of individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers. For design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling and minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near building entries.

M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

N. For variable air volume systems powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

O. On fan powered VAV boxes, adjust air flow switches for proper operation

P. Procedures shall be in accordance with SMACNA Standards and ASHRAE recommendations.

END OF SECTION 15990

SECTION 16010 ELECTRICAL REQUIREMENTS

PART I GENERAL

1.01 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 16 Sections, in addition to Divisions 15/16 Section 15000, Supplementary General Conditions Applicable to Mechanical and Electrical Work and all City of New London Requirements.

1.02 WORK BY OWNER

NONE

1.03 OWNER FURNISHED PRODUCTS

NONE

1.04 FUTURE WORK

NONE

1.05 ALLOWANCES

A. The project documents shall provide for an allowance figure to be carried for needed remedial work that is discovered during the re-conditioning effort. The allowance shall be used to cover direct material and labor costs. The Contractors overhead/profit and taxes shall be included in the base bid proposal and will not be charged against this allowance figure. The work to be done under the allowance will be managed by the Construction Manager and/or Engineer.

1.06 UNIT PRICES

NONE

1.07 ALTERNATES

NONE

1.08 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. NFPA- Life Safety 101: NFPA Codes- All

C. BOCA- National Building Code

D. Local codes and Authority Having Jurisdiction

1.09 SUBMITTALS

A. Submit under provisions of each Section.

B. Proposed Products List: Include Products specified in the following Sections:

1. Section 16010.
2. Section 16060.
3. Section 16111.
4. Section 16112.
5. Section 16123.
6. Section 16130.
7. Section 16140.
8. Section 16170.
9. Section 16190.
10. Section 16191.
11. Section 16195.
12. Section 16426.
13. Section 16441.
14. Section 16470.
15. Section 16477.
16. Section 16480.
17. Section 16721.
18. Section 16725.
19. Section 16727.

C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

D. Mark dimensions and values in units to match those specified.

1.10 REGULATORY REQUIREMENTS

A. Conform to applicable State of CT Building Codes.

B. Electrical: Conform to NFPA 70.

C. All other applicable codes, statutes, regulations, and Authority Having Jurisdiction.

1.11 TERMS AND DEFINITIONS

A. The term "provide" shall mean the Contracttor is to furnish, fabricate, complete, deliver, install and erect including all labor materials, tools, services, and expense required to complete in place, ready for operation or use under terms of the CONTRACT DOCUMENTS.

B. The term "as indicated" or "as shown" shall mean as shown or indicated on the drawings. The term " as directed" or "as selected" shall mean direction or selection by the Engineer.

1.12 INTENT

A. It is the intention of the specifications and drawings to provide for finished work, tested and ready for operation.

B. Items and services not shown on drawing, but mentioned in specification, or vice versa, necessary to render the work complete and ready for operation, shall be provided without additional cost to the Owner.

C. The Contractor shall familiarize himself with the drawings and specifications of the other trades, particularity the mechanical trades. Work that is contingent upon the

work of other trades shall be fully coordinated with prior to the Bid submission. Failure to properly coordinate work requirements does not relieve the Contractor from completing all work.

D. The drawings are general layout schematics and do not show every fitting, transition, offset,...etc or device mentioned within the specifications. All items necessary for proper installation, operation, and maintenance of the architectural/electrical/mechanical equipment and systems shall be included, the same as if herein specified.

E. Prior to submission of Bid, the Contractor shall give written notice to the Engineer of any materials or apparatus believed unsuitable or inadequate, in violation of any laws, ordinances, rules, or regulations of authorities having jurisdiction, and any necessary items being omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included all required items in his proposal.

The work required under this section includes all labor, materials, services, and equipment necessary for and reasonably incidental to the proper and complete installation of all lighting systems, power systems, and distribution systems as set forth or reasonably implied on the drawings and in these specifications, notwithstanding, that each and every item necessarily involved may not be specifically mentioned.

1.13 WORK INCLUDED

A. The principal items of the electrical work shall include, but are not necessarily limited to the following:

1. Providing for the replacement of the secondary power distribution feeder to the building from an Eversource network power manhole. The manhole is located on the Masonic street side of the building, rear. Examine existing site and basement level to determine the extent of this work. Provide all coordination work with Eversource. The utility contact is noted on the plans. Include all Eversource company charges in the bid proposal. This effort shall include providing for manhole cut/patch/entry in conjunction with Eversource. Provide all sidewalk removal and repair, pedestrian personnel safety measures, seeding/lawn repair, coordination with “Call Before You Dig”, curb repairs; all as required for a complete effort. There are existing conduits in the excavation area that provide various communications services to the building that **must be kept in service**, see 2) below and drawing E-10 note.

2.. Providing for all coordination with the City of New London IT Department. This includes but is not limited to identifying, maintaining and protecting the existing optical fiber circuit/service, Frontier service and TV service. **These services are routed through the building and must be identified and protected. The fiber/copper, data service, must remain in use during the reconstruction effort. See drawing E-10 Note **.**

3. Providing all conduits, secondary service lateral complete, bonding and grounding for the power distribution system. Providing for all feeders, branch circuits, voice/data/video and control lines per the drawings.

All wiring must be new (with the notable exception of existing voice/video/data links- as noted). Existing salvable conduits may be re-

used if they meet the project requirements and are preserved during the demolition process.

4. Providing for the common bonding and grounding of all equipment.

5. Provision for premium time and scheduling of work as required to complete the work.

6. Providing for a communications horizontal cabling /pathway system including all supports, identifications, pathways, cables, terminations, jacks, and patch panels as required for a complete system. See drawing E-10 Note **.

   The contractor shall work with and consult with the Owners IT department, as needed to determine the rack and patch panel layout. See drawing E-10 note *.

   Providing for the certification testing of each data link of the system. A complete written report of each cable test and certification will be required for the owner at the completion of the project.

7. Providing for general, emergency and exit lighting systems. This includes the aiming, adjustment and cleaning of the illumination instruments. The contractor will be required to adjust the site lighting during evening hours when a dark sky will permit aiming/adjustment. Allow up to 6 hours for this after-hours effort.

   As part of this effort the contractor will be responsible for the power supply and control lines for lighting fixtures re-conditioned by others. This contractor must coordinate with the others to insure voltages, power required and control lines seamlessly coordinate with the work done by others.

8. Providing temporary light and power for the project.

9. Providing for the demolition, removal and proper disposal of existing electrical systems and debris as required to complete the project. Disposal to be done in accordance with CT laws.

10. Providing all necessary equipment and rigging for the execution of the electrical work. **Contractor is solely responsible for verification of space limitations and/or equipment entry clearances to spaces.**

11. Providing for all wiring devices including motion detectors, switches, sensors, power packs, and other wiring devices. Providing power and data outlets for video monitors as required.

12. Providing for surface raceways/pathways for both power and data services as shown on the plans and details.

13. Providing for the replacement of the existing fire alarm system with a voice evacuation type system per the contract documents. **See specific notes in the fire alarm specification for protection during the construction period.**

14. Providing for the fireproofing of all conduit/electrical penetrations.

15. Providing for the complete testing and reporting of all tests of the electrical systems as required by all relevant NFPA Codes/Standards.

16. Providing for all cutting/patching, drilling, trenching, concrete work, concrete cut/patch/repair, asphalt cut/patch/repair, equipment pads, painting, touch-up painting, access doors, grading, planting and re-seeding of lawn areas as required for a complete project.

17. Providing for training, demonstration, testing, commissioning, adjustment, cleaning and support materials for the equipment under this project. This shall include owner representative training in how to use and maintain each equipment.

18. Providing for all coordination with the City of New London and Eversource for the procurement of energy reduction incentives as may be available to the City for this project. This shall include but be limited to providing data on products used, number of devices and operating modes.

19. Providing for coordinated surge suppression.

20. Providing for spare conduits, junction boxes, sleeves and conduit/sleeve fire safing.

21. Providing for distribution and power feeds for all HVAC equipment, elevator, pumping systems, air handling equipment, water heaters, fan coils and other mechanical equipment.

22. Providing for power feeds to all temperature/DDC panels. Allow for up to 20 circuits each 75', each 20A, 120V. Control wiring is by Division 15.

23. Providing for the installation of motor starters, variable frequency speed drives and other electrical equipment as supplied by Division 15.

24. Providing telephone conduits and cabling per the project drawings.

25. Providing for the effective disconnect, grounding ,bonding and making safe electrical systems to be removed.

26. Providing for façade and flag pole lighting systems.

27. Providing for repowering existing clock and camera systems.

28. Providing for the waterproofing of all conduit entries into the building. **In particular the service lateral cables must use fittings per the detail to effectively seal out water entry into the basement main service switch.**

29. Providing for the coordination with and scheduling of the electrical work to coincide with the overall project schedule. This will require the contractor to meet with and both the owner and project administrators to effective determine and execute a mutually acceptable working schedule.

1.14 WORK NOT INCLUDED

NONE

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXISTING SYSTEMS

A. All existing systems shall remain in use until cutover to new systems can be done.

3.02 PERMITS

A. The Contractor shall give all necessary notices, obtain all permits and pay all state and local taxes, fees and other costs in connection with his work. He shall prepare documents, file all necessary plans and obtain all necessary approvals of all state and local departments having jurisdiction. He shall obtain and deliver all Certificates of Inspection to the Owner before requesting acceptance and final payment for the work.

B. The Contractor shall be responsible for performing any and all inspections required by the Building Code Official and the local Fire Marshal.

3.03 MEASUREMENTS

A. All measurements shall be taken at the site; actual measurements to take precedence over scale dimensions. The Contractor shall make necessary field measurements to determine space requirements.

3.04 COORDINATION OF WORK

A. Coordinate the work with the work of other trades and check the drawings and specifications for the work of other trades to assure proper location of the materials and equipment provided. Verify all power requirements for ratings and compatibility for equipment supplied by others but to be connected by the electrical contractor.

B. Closely schedule the work so that the work will be installed at the proper time without delaying the completion of the project.

C. Where the work will be installed in close proximity to the work of other trades, or where there is evidence that the work will interfere with the work of other trades, arrange space conditions to make a satisfactory adjustment. If the work is installed before coordinating with other trades, make necessary changes to the work to correct the condition without additional cost to the owner.

D. Prepare complete set of drawings showing all necessary slab openings and structural supports that require structural framing. Drawings shall clearly indicate sizes and location relative to column lines. Drawings shall be completed in sufficient time to allow for structural steel fabrication so as not to delay the project schedule.

3.05 SCAFFOLDING, RIGGING, HOISTING

A. Unless otherwise specified, the work shall include all scaffolding, rigging, hoisting and service necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from the premises when no longer required.

3.06 AS-BUILT DRAWINGS

A. Keep a record on prints of all changes and additions to the systems and show exact location of all concealed and buried conduits. Reproducible, CAD, "as builts" shall be provided to the owner at the conclusion of the project, prior to project close-out.

3.07 SUPERVISION

A. The Contractor shall personally, or through an authorized and competent representative, constantly supervise the work from beginning to completion and final acceptance without notice from anyone. As far as possible, he shall keep the same foremen and workmen throughout the project duration.

3.08 CLEANING

A. The Contractor shall at all times keep the premises free from surplus material and rubbish and he shall not have undue surplus material for which there is no immediate use on site in the work areas.

B. At the completion of the work the Contractor shall remove his entire plant and equipment, rubbish, waste, and surplus materials. He shall leave the premises broom clean.

3.09 EXISTING CONDITIONS

A. The Contractor shall visit the site of the work and familiarize himself with all available information concerning the existing nature of the structural, mechanical, and electrical conditions bearing on the installation, transportation, handling, storage of necessary materials and equipment. Access to and from the work areas to be assessed carefully as a job site condition. Failure of the Contractor to acquaint himself with all available information concerning the foregoing conditions will not relieve him from responsibility for estimating the difficulties and costs of successfully performing the complete work under this contract.

3.10 PHASING OF THE WORK

A. All work will be coordinated by the Contractor and phasing of the work to accommodate the facility occupancy/scheduling requirements will be a part of the scope of work. Refer to General Conditions and other technical specifications for phasing requirements.

3.11 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work required. Do not scale the drawings. Consult the drawings and details, and drawings of other trades, for exact location of equipment. The contractor is cautioned to examine **all** of the contract drawings to ascertain the full extent of the work required under this or any other division.

B. Drawings shall be used in layout of the work. Check reference drawing to verify spaces in which the work will be installed. Maintain maximum headroom and space conditions. Where headroom or space conditions appear inadequate, the Architect shall be notified **before** proceeding with the installation.

C. As directed by the Engineer, make minor modifications in the layout as needed to prevent conflicts with the work of other trades or for the proper execution of the work.

3.12 EQUIPMENT SUBSTITUTIONS

A. Whenever the terms "or equal" or " or approved equal" are used, substitutions are permitted provided the substitution conforms to the specified item with regard to quality, noise generated, operating efficiency, and method of operation. Performance in the schedules and the specifications shall be interpreted as the required minimum performance. Substitutions are subject to approval by the Engineer.

B. Where an item of equipment is proposed, other than specified, and requires adjustments to the structure, ceilings, piping, ductwork, or wiring, etc., any redesign, drawing revisions, resubmissions to local officials, or costs incurred therein, shall be the responsibility of the Contractor.

3.13 WARRANTIES AND GUARANTEES

A. Materials and Workmanship Warranty - All materials, workman-ship and the entire installation shall be maintained and serviced for a period of one year from date of acceptance by the Owner. Leave entire system installed under this Contract in perfect working order, and replace any work or material which develops defects within the warranty period, at no cost to the Owner.

1. Perform all work in a practical, neat and workmanlike manner with mechanics skilled in the work and using the very best practices of the trade involved.

2. No work shall be concealed until it has been inspected and approved by the Architect.

B. Equipment Warranty - The manufacturer shall warrant that the equipment which he has furnished is free from defects in material and workmanship and meets the specified performance. Obligations under this warranty shall be as follows:

1. For a period of one year from date of acceptance by the Owner or eighteen (18) months, except (60) months or 5 years for diesel generator, from date of shipment, the equipment manufacturer/supplier shall provide and pay for all labor, parts, accessories, material, freight and other work required for the repair or replacement of any equipment or part therein which is found to be defective.

2. Where a system fails to meet the intended performance, any unsatisfactory conditions must be corrected by the installing Contractor. Where questions arise concerning inadequacy of the design, the burden of proof rests upon the Contractor.

C. The Contractor shall deliver to the Owner a copy of all man-manufacturer warranties before requesting acceptance and final payment for the work.

D. Acceptance will be upon written request by the contractor that the work is finished and that an acceptance inspection is requested. Acceptance by the Engineer will be made in writing. The guarantee period will begin on the acceptance date. The guarantee may also begin upon substantial completion', this will also require an Engineer's certification that substantial completion has been reached.

3.14 INSURANCE

A. This Contractor shall carry and pay for Liability and Worker's Compensation Insurance for the duration of the contract and shall protect the Owner against any claims that may arise.

B. This Contractor shall also be listed as a subject employer by Federal and State Unemployment Compensation and shall furnish the Owner with his registration number.

3.15 WATERPROOFING

A. Where any work penetrates exterior surfaces, such as roofs, exterior walls, or slabs on grade, such penetrations shall be waterproofed in a manner subject to the Engineer's approval. All necessary sleeves, caulking and flashing required to make openings watertight shall be furnished and installed.

3.16 PIPE SLEEVES AND SEALING

A. Metal sleeves are required at all conduit penetrations through foundation walls, exterior walls, and all fire rated partitions. Sleeves shall generally be 18 gauge galvanized sheet metal, except through foundation walls sleeves shall be Schedule 40 steel pipe. The length of pipe sleeves shall be equal to the depth of the construction, except in waterproof floor construction sleeves shall extend a minimum of 2" above the finished floor.

B. In foundation walls and floors below grade, the space between the conduit and sleeve shall be sealed watertight using a modular mechanical type of seal, consisting of interlocking synthetic rubber links assembled with bolts and pressure plates to form a continuous rubber belt. The mechanical seal shall be equal to or exceeding the quality of "Link-Seal" as manufactured by "Thunderline Corp."

C. In fire rated construction, pack space between sleeve and conduit with fire retardant putty, sealant and/or caulk. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479. Manufacturer: Dow Corning - Firestop 2001; Nelson - CLK,FSP; Standard Oil - Fyre Putty; 3M -CP-25.

D. Where conduit passes through masonry walls or floors, sleeves may be omitted. The space around the conduit shall be packed with a fire-retardant, non-toxic, non-shrinking or hardening, U.L. classified putty equal to "Flameseal" as manufactured by "Nelson Electric" of Tulsa, Oklahoma.

3.17 DELIVERY, SCAFFOLDING, RIGGING, HOISTING

A. The Contractor shall transport and hoist all his own materials and equipment, or arrange and pay for transportation and hoisting by other Contractors of the project.

B. The Contractor shall be responsible for receiving, uncrating, checking and properly storing his own equipment and apparatus delivered to the job site for installation in the building.

C. Equipment shall be protected when stored in areas exposed to the elements or hazards of construction.

3.18 ASBESTOS MATERIALS

A. Asbestos impregnated materials may be encountered within existing facilities. When encountered, the Contractor shall cease work, notify the Engineer and shall reschedule his work to allow for asbestos abatement by others under a separate contract with the Owner.

3.19 EQUIPMENT FOUNDATIONS

A. The Contractor shall furnish all necessary templates, forms, patterns, etc., for foundations, support pads, bases, and piers required for all equipment, switchboards, luminaires, panels,..etc., and shall submit drawings to the Engineer for approval before purchase or fabrication. Concrete work shall be by the Contractor.

3.20 EXCAVATION, BACKFILLING AND PIPE SUPPORT

See Section 15000

.

3.21 CUTTING/PATCHING AND DRILLING

See Section 15000

END OF SECTION 16010

SECTION 16060 ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED SECTIONS

NONE

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities. **See specific note on E-10 for the identification and maintenance of existing voice/video and data services that must be maintained.**

C. Demolition Drawings are based on casual field observation. Report discrepancies to Owner before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with Owner.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: to be replaced.

E. Existing Fire Alarm System: to be replaced. **See fire alarm specification for notes on protection during the construction period.**

3.03 DISCONNECTING AND MAKING SAFE

A. The contractor shall disconnect the power supply to the building and make the existing distribution system safe. This may include but is not limited to testing for voltages, testing for stray voltages, testing for electrolytic action, bonding the

disconnected system to earth ground, installing bond jumpers as required to effectively bond the partial elements of the distribution system. Every effort to provide effective bonding shall be provided by the contractor.

3.04 DEMOLITION AND EXTENSION OF EXISTING VISIBLE ELECTRICAL WORK

A. Demolish/remove existing visible, disconnected, made safe electrical work under provisions of this Section. This work may be done by others, i.e.–general contractor. Field verify.

Remove abandoned wiring to source of supply.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

Existing conduit that meets or exceeds the project specification may be retained by the contractor for reuse.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment .

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.05 INSTALLATION

A. Install relocated materials and equipment under the provisions of this Section.

3.06 DISPOSAL OF EQUIPMENT

A. All electrical equipment that is not to be reused is to be removed from the premises by the electrical contractor. This is to be done in an orderly and timely fashion.

C. Disposal of PCB ballasts is to be done in accordance with CT Statutes and by approved/listed disposal service companies.

END OF SECTION 16060

SECTION 16111 CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal conduit.

B. Flexible metal conduit.

C. Liquidtight flexible metal conduit.

D. Electrical metallic tubing.

E. Nonmetal conduit.

F. Fittings and conduit bodies.

1.02 RELATED SECTIONS

A. Section - Fire Stopping.

B. Section 16130 - Boxes.

C. Section 16170 - Grounding and Bonding.

D. Section 16190 - Supporting Devices.

E. Section 16195 - Electrical Identification.

1.03 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

C. ANSI C80.5 - Rigid Aluminum Conduit.

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. ANSI/NFPA 70 - National Electrical Code.

F. NECA "Standard of Installation."

G. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

H. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.04 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

1.05 SUBMITTALS

A. Submit under provisions of Section Submittals.

B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, and conduit bodies.

1.06 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section Record Drawings.

B. Accurately record actual routing of conduits larger than 2 inches.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.08 FIELD SAMPLES

Not required.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.10 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Minimum Size: 3/4 inch**.**

B. Underground Installations:
   1. More than Five Feet from Foundation Wall: Use rigid steel conduit and thickwall Sch 40 PVC, nonmetallic conduit as specifically indicated on the drawings. Extend PVC conduits out of slab in rigid steel elbows and risers.
   2. Within Five Feet from Foundation Wall: Use rigid steel conduit.

3. Under Slab on Grade: Use Sch 40 PVC conduit or as noted on the plans. Provide rigid steel conduit elbows on all PVC conduit. Extend PVC conduits out of slab in rigid steel elbows and risers.
4. Minimum Size: 1 1/4 inch.
5. Waterproof joints.

C. Outdoor Locations, Above Grade: Use rigid steel and waterproof joints.

D. In Slab Above Grade: Use rigid steel conduit 3/4 inch; 1/2 inch for conduits crossing each other.

E. Wet and Damp Locations: Use rigid steel and intermediate metal conduit, thickwall nonmetallic conduit where not subject to physical abuse.

F. Dry Locations:
1. Concealed: Use rigid steel, and electrical metallic tubing.
2. Exposed: Use rigid steel, intermediate metal conduit, and electrical metallic tubing where not subject to physical abuse.
3. **See note on the plans for concealing all raceways and or circuits in public, lobby, corridor and stair areas.**

Use rigid steel conduit in mechanical rooms, boiler rooms, shops and other similar areas

2.02 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC):Rigid steel.

C. Fittings and Conduit Bodies:ANSI/NEMA FB 1; material to match conduit.

2.03 FLEXIBLE METAL CONDUIT

A. Description:Interlocked steel/aluminum construction.

B. Fittings:ANSI/NEMA FB 1.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description:Interlocked aluminum construction with PVC jacket.

B. Fittings:ANSI/NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description:ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies:ANSI/NEMA FB 1; steel, compression type.

2.06 NONMETALLIC CONDUIT

A. Description:NEMA TC 2; Schedule 40 and 80 PVC.

B. Fittings and Conduit Bodies:NEMA TC 3.

2.07 NONMETALLIC TUBING

A. Description:NEMA TC 2.

B. Fittings and Conduit Bodies:NEMA TC 3.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install conduit in accordance with NECA "Standard of Installation." **All conduit in finished areas is to be concealed.**

B. Install nonmetallic conduit in accordance with manufacturer's instructions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

F. Fasten conduit supports to building structure and surfaces under provisions of Section 16190.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports

H. Do not attach conduit to ceiling support wires.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Route exposed conduit parallel and perpendicular to walls.

K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

L. Route conduit in and under slab from point-to-point.

M. Do not cross conduits in slab.

N. Maintain adequate clearance between conduit and piping.

O. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).

P. Cut conduit square using saw or pipecutter; de-burr cut ends.

Q. Bring conduit to shoulder of fittings; fasten securely.

R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

S. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

T. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.

U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.

W. Provide suitable pull string in each empty conduit except sleeves and nipples.

X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

Y. Ground and bond conduit under provisions of Section 16170.

Z. Identify conduit under provisions of Section 16195.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of project specifications.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified under other Sections.

END OF SECTION 16111

SECTION 16112-SURFACE RACEWAYS

PART 1GENERAL

1.01 SECTION INCLUDES

A. Surface metal raceways.

B. Multi-outlet assemblies.

C. Wireways.

1.02 RELATED SECTIONS

A. Section 16140 - Wiring Devices: Receptacles.

1.03 REFERENCES

A. NECA (National Electrical Contractor's Association) Standard of Installation.

B. NEMA WD 6 - Wiring Device Configurations.

1.04 SUBMITTALS

A. Submit under provisions of Section Submittals.

B. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2PRODUCTS

2.01 SURFACE NON METALLIC RACEWAY

A. Manufacturers:

1. Panduit Twin T70 Series surface raceway system base, divider and cover, fittings and brackets.

B. Description: PVC channel with fitted cover, suitable for use as surface raceway.

C. Size: 7.23” x 1.77” x length, see plans..

D. Finish: selected by Architect, paintable.

E. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories.

F. Receptacles: Provide covers and accessories to accept convenience receptacles specified in Section 16140.

F. Receptacle Color: by Architect.

G. Channel Finish: Color as selected by Architect.

H. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors. **See plan note with reference to Part #s .**

2.02 MULTIOUTLET ASSEMBLY

A. Manufacturers:

1. Wiremold.

B. Multioutlet Assembly: Sheet metal channel with fitted cover, with pre-wired receptacles, suitable for use as multioutlet assembly.

C. Size: 7/8" x 1 1/4".

D. Receptacles: Provide covers and accessories to accept convenience receptacles specified in Section 16140.

E. Receptacle Color: by Architect.

F. Channel Finish: Color as selected by Architect.

G. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors. **See plan note with reference to Part #s .**

2.03 WIREWAY

A. Description: General purpose and Raintight type wireway.

B. Knockouts: Manufacturer's standard.

C. Size: As indicated on Drawings.

D. Cover: Screw cover with full gasketing.

E. Connector: Flanged.

F. Fittings: Lay-in type with removable top, bottom, and side; captive screws with drip shield.

G. Finish: Rust inhibiting primer coating with gray enamel finish.

2.05 SURFACE METAL RACEWAY- BRANCH CIRCUITS

A. Manufacturers:

1. Wiremold

B. Description: V-700, one piece, sheet metal channel with fitted cover, suitable for use as a surface metal raceway.

C. Size: 3/4" x 21/32".

D. Finish: Color as selected by Architect.

E. Fittings, Boxes and Extension Rings: Furnish manufacturer's standard accessories. **See plan note with reference to Part #s .**

F. Use V-700 surface raceway for all exposed wiring. Use this raceway switch/motion/dimmer switch lighting control lines in the offices. Use for power, telephone and data receptacles, as may be required. Each system will use an independent surface raceway.

PART 3EXECUTION

3.01 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.

C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

D. Wireway Supports: Provide steel channel as specified in Section 16190.

E. Close ends of wireway and unused conduit openings.

F. Ground and bond raceway and wireway under provisions of Section 16170.

END OF SECTION 16112

SECTION 16123 BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire and cable.

B. Wiring connectors and connections.

1.2 RELATED SECTIONS

A. Section 16195 - Electrical Identification.

1.3 REFERENCES

A. NECA Standard of Installation (National Electrical Contractors Association).

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

C. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals.

B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Section Contract Closeout: Procedures for submittals.

B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 FIELD SAMPLES

Not required.

1.9 PROJECT CONDITIONS

A. Verify that field measurements are as indicated.

B. Conductor sizes are based on copper.

C. Aluminum conductors are not allowed.

D. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

1.10 COORDINATION

A. Coordinate Work under provisions of this Section.

B. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers:
1. Okonite.
2. Rome.
3. Southwire.

B. Description: Single conductor insulated wire.

C. Conductor: Copper, 90 degree C rated.

D. Insulation Voltage Rating: 600 volts.

E. Insulation: NFPA 70; Type XHHW insulation for feeders and branch circuits larger than #1 AWG; Type THHN/THWN-2 insulation for feeders and branch circuits #2 AWG and smaller. Use XHHW-2 for underground feeders.

2.2 METAL CLAD CABLE

A. Manufacturer

1. Okonite

2. Rome

3. Southwire

B. Description: NFPA 70; Type MC.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 V.

E. Armor Material: Steel.

F. Ground: Separate ground wire.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

C. Verify that raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

A. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN-2 and XHHW insulation, in raceway; MC cable may be used for branch circuit wiring only as permitted by code.

B. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN-2 and XHHW insulation, in raceway.

C. Above Accessible Ceilings: Use only building wire, Type THHN/THWN-2 and XHHW insulation, in raceway; MC cable may be used for branch circuit wiring only.

D. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN-2 and XHHW insulation in raceway.

E. Exterior Locations: Use only building wire, Type THHN/THWN-2 and XHHW insulation in raceway.

F. Underground Installations: Use only building wire, Type XHHW-2 insulation, in raceway.

G. Use wiring methods indicated.

3.4 INSTALLATION

A. Quality Control: Manufacturer's instructions.

B. Route wire and cable as required to meet Project Conditions.

C. Install cable in accordance with the NECA "Standard of Installation."

D. Use solid conductor for feeders and branch circuits 10 AWG and smaller.

E. Use stranded conductors for control circuits.

F. Use conductor not smaller than 12 AWG for power and lighting circuits.

G. Use conductor not smaller than 14 AWG for control circuits.

H. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

I. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (as applies).

J. Pull all conductors into raceway at same time.

K. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

L. Protect exposed cable from damage.

M. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels or ceiling structure.

N. Use suitable cable fittings and connectors.

O. Neatly train and lace wiring inside boxes, equipment, and panelboards.

P. Clean conductor surfaces before installing lugs and connectors.

Q. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

R. Terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with antioxidant compound before installing conductor.

S. Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.

T. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

U. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

V. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

W. Trench and backfill for conduit installation as specified. Install warning tape along entire length of direct burial cable, within 3 inches (75 mm) of grade.

X. Identify and color code wire and cable under provisions of Section 16195. Identify each conductor with its circuit number or other designation indicated.

3.5 FIELD QUALITY CONTROL

A. Quality Control: Field inspection, testing, and adjusting.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

D. Perform inspections and test reporting in accordance with NEC NFPA 70.

END OF SECTION 16123

SECTION 16130 BOXES

PART 1GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling outlet boxes.

B. Floor boxes.

C. Pull and junction boxes.

1.02 RELATED SECTIONS

A. Section - Firestopping.

B. Section - Access Doors.

C. Section 16140 - Wiring Devices: Wall plates in finished areas, floor box service fittings, fire-rated poke-through fittings, and floor boxes.

D. Section 16721- Fire Alarm System

1.03 REFERENCES

A. NECA - Standard of Installation.

B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

F. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals: Procedures for submittals.

1.05 SUBMITTALS FOR CLOSEOUT

A. Section Contract Closeout: Submittals for Project closeout.

B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch (13 mm) male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 16140.

2.02 FLOOR POKE THROUGH

A. Hubbell System One series product. Provide a complete assembly including but not limited to through fitting, brass cover plate with openings for power and data and sub plates as needed for power and data. Poke through fittings are designed for use in a concrete floor. The floor structure is not a concrete slab but a tile and concrete composite assembly. The contractor shall modify the floor penetration to be able to use the fittings in a non poured concrete floor. The contractor must provide a sketch to the architect to show how the floor penetration will be adapted to the fittings. Architect must approve the proposed methodology.

B. Material: Steel.

C. Shape: 3” or 4” hole as required

E. Service Fittings: (1) 20A receptacle, (2) data jacks.

F. Flanges: Brass.

G. Verify exact placement with Architect.

2.03 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 16160.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 6; flat-flanged, surface mounted junction box:
   1. Material: Galvanized cast iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting:
   1. Material: Galvanized cast iron.

2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
3. Cover Legend: "ELECTRIC".

E. In-Ground Sch 40 PVC Box: NEMA TC-2, Federal Specifications WC1094A and UL 651.

1. Material: Sch 40 PVC.

PART 3EXECUTION

3.01 EXAMINATION

A. Verify locations of floor boxes and outlets in offices, auditorium, gymnasium and other areas as required, prior to rough-in.

3.02 INSTALLATION

A. Install boxes in accordance with NECA "Standard of Installation."

B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

C. Set wall mounted boxes at elevations to accommodate mounting heights indicated and or specified in section for outlet device. Verify with Architect and elevation architectural plans.

D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 20 feet if required to accommodate intended purpose.

E. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.

F. Maintain headroom and present neat mechanical appearance.

G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

I. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section penetration fire stops.

J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

K. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

M. Use flush mounting outlet box in finished areas.

N. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

O. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.

P. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

Q. Use stamped steel bridges to fasten flush mounting outlet box between studs.

R. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

S. Use adjustable steel channel fasteners for hung ceiling outlet box.

T. Do not fasten boxes to ceiling support wires.

U. Support boxes independently of conduit.

V. Use gang box where more than one device is mounted together. Do not use sectional box.

W. Use gang box with plaster ring for single device outlets.

X. Use cast outlet box in exterior locations exposed to the weather and wet locations. Bond all metal parts.

Y. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations. Bond all metal parts.

Z. Set floor boxes level.

AA. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations. Bond all metal parts.

3.03 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of outlet box for equipment connected under other sections.

3.04 ADJUSTING

A. Section Contract Closeout: Testing, Adjusting, and Balancing, Adjusting installed work.

B. Adjust floor box flush with finish flooring material.

C. Adjust flush-mounting outlets to make front flush with finished wall material.

D. Install knockout closures in unused box openings.

3.05 CLEANING

A. Section Contract Closeout: Cleaning installed work.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION 16130

SECTION 16140 WIRING DEVICES

PART 1GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Device plates and decorative box covers.

E. Floor box service fittings.

F. Poke-through service fittings.

1.02 RELATED SECTIONS

A. Section 16130 - Boxes.

1.03 REFERENCES

A. NECA - Standard of Installation.

B. NEMA WD 1 - General Requirements for Wiring Devices.

C. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

D. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals: Procedures for submittals.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

1.07 EXTRA MATERIALS

A. Furnish 10 of each style, size, and finish wall plate.

PART 2 PRODUCTS

2.01 WALL SWITCHES

A. Switches:
1. Hubbell, 1221, 1221-L (lock), series actual part number as needed, color as selected by Architect.
2. Leviton.
3. P and S.

B. Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.

C. Body and Handle: Color as selected by Architect plastic with toggle handle and/or as indicated.

D. Indicator Light: Separate pilot strap; red or green color lens.

E. Ratings:
1. Voltage: 120-277 volts, AC.
2. Current: 20 amperes.

2.02 RECEPTACLES

A. Manufacturers:
1. Hubbell 5362 series actual part number as needed, color as selected by Architect.
2. Leviton.
3. P and S.

B. Description: NEMA WD 1, Heavy-duty general use receptacle.

C. Device Body: Color as selected by Architect plastic.

D. Configuration: NEMA WD 6, type as specified and indicated.

E. Convenience Receptacle: Type 5-20.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements, specification grade (contractor may use GFI C/B to protect circuit in lieu of GFCI receptacle).

G. Provide Hubbell GF-5362 20A, color, or equivalent ground fault protection devices.

H. Telephone Jack: see details on drawings.

I. Damp and or wet area receptacles and in-use covers must be weather resistant listed for specific wet/damp areas. A weather–proof device shall mean an in-use cover and a weather resistant device.

2.03 WALL VACANCY SENSOR, WALL SWITCH - NO DIMMING, LINE VOLTAGE

A. Douglas WVSSDUI-P-VW/equal. Color to be confirmed by Architect.

2.04 CEILING OCCUPANCY SENSOR 24VAC, SWITCHES LINE VOLTAGE POWER PACK, 20A

A. Sensor, Douglas sensor, dual tech, 24VAC; Douglas WVRSDD!-R-N. Color to be confirmed by Architect.

B. Power Pack, Douglas WP-PP20-D

2.05 WALL DIMMER WITHOUT VACANCY SENSING- 0-10VDC

A. Lutron Diva dimmer, 0-10VDC, 8A, dimming control, or equal. Color by Architect.

2.06 WALL PLATES

A. Decorative Cover Plate: Smooth stainless steel, non rusting. **Verify withArchitect**.

B. Jumbo Cover Plate: Smooth stainless steel, non rusting.

B. Weatherproof Cover Plate: Gasketed cast metal with hinged, gasketed device cover.

2.07 VACANCY SENSOR AND SWITCH DIMMER, BOTH ON DATA BUS

A. Douglas, dual tech sensor on data bus; Douglas WORSDG1-P-N

B. Douglas, switch dimmer on data bus; Douglas WSD-3501

2.08 LIGHTING CONTROL SYSTEM

A. See the drawings for additional equipment descriptions/part numbers to complete the lighting control system requirements. Based on Douglas product lines.

PART 3EXECUTION

3.01 EXAMINATION

A. Coordination and Meetings: Verification of existing conditions prior to beginning work.

B. Verify that outlet boxes are installed at proper height.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that floor boxes are adjusted properly.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that openings in access floor are in proper locations.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.03 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

E. Do not share neutral conductor on load side of dimmers.

F. Install receptacles with grounding pole on top.

G. Connect wiring device grounding terminal to outlet box with bonding jumper and to branch circuit equipment grounding conductor.

H. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

I. Connect wiring devices by wrapping conductor around screw terminal.

J. Use jumbo size plates for outlets installed in masonry walls, as required.

K. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

L. Install protective rings and split nozzle on active flush cover service fittings.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights specified and indicated on drawings.

B. Install wall switch at height above finished floor determined by Architect.

C. Install convenience receptacle at height above finished floor determined by Architect.

D. Install convenience receptacle 6 inches above counter/ backsplash of counter.

E. Install dimmer at height above finished floor determined by Architect..

F. Install telephone/data jacks at height above finished floor determined by Architect.

G. Install telephone jack for side-reach wall telephone to position top of telephone at 54 inches above finished floor. Verify height with Architect.

H. Install telephone jack for forward-reach wall telephone to position top of telephone at 48 inches above finished floor. Verify height with Architect.

3.05 FIELD QUALITY CONTROL

A. Quality Control: Field inspection, testing, adjusting, and balancing.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify that each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

G. Verify that each telephone jack is properly connected and circuit is operational.

3.06 ADJUSTING

A. Section Contract Closeout: Adjusting installed work.

B. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

A. Section Contract Closeout: Cleaning installed work.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 16140

SECTION 16170 GROUNDING AND BONDING

PART 1GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 RELATED SECTIONS

None.

1.03 REFERENCES

A. Quality Control: Requirements for references and standards.

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

C. NFPA 70 - National Electrical Code.

1.04 GROUNDING SYSTEM DESCRIPTION

A. Metal underground water pipe.

B. Metal frame of the building.

C. Concrete-encased electrode.

D. Rod electrode.

1.05 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms.

1.06 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals: Procedures for submittals.

B. Product Data: Provide for grounding electrodes and connections.

1.07 SUBMITTALS FOR INFORMATION

A. Section Submittals: Submittals for information.

B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.08 SUBMITTALS FOR CLOSEOUT

A. Section Contract Closeout: Procedures for submittals.

B. Project Record Documents: Record actual locations of components and grounding electrodes.

C. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.09 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.10 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2PRODUCTS

2.01 ROD ELECTRODES

A. Manufacturers:
1. Thomas and Betts.
2. Blackburn.

B. Material: Copper-clad steel.

C. Diameter: 3/4 inch .& 5/8 inch, as noted.

D. Length: 10 feet & 8 feet, as noted.

2.02 MECHANICAL CONNECTORS

A. Manufacturers:
1. Thomas and Betts.
2. Blackburn.

B. Material: Bronze.

C. Mechanical connectors may be used above grade only.

2.04 EXOTHERMIC CONNECTIONS

A. Manufacturers:
1. Cadweld

2.05 WIRE

A. Material: Stranded copper.

B. Foundation Electrodes: 4/0 AWG or as noted on the plans.

C. Grounding Electrode Conductor: Size to meet NFPA 70 requirements and as noted on the plans.

PART 3EXECUTION

3.01 EXAMINATION

A. Coordination and Meetings: Verification of existing conditions prior to beginning work.

B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

A. Quality Control: Manufacturer's instructions.

B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

C. Provide bonding to meet Regulatory Requirements.

D. Bond together any metal siding not attached to grounded structure; bond to ground.

E. Bond together each metallic raceway, pipe, duct and other metal object entering building. Use 2 AWG bare copper conductor, minimum size or as noted.

Bond across all fabric/plastic/fiberglass/other nonconductive sections of duct work with a # 6AWG minimum size bonding jumper. A continuous metal/conductive bond is required across all duct sections.

F. Provide isolated grounding conductor for circuits supplying electronic data processing circuits.

G. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

H. Provide copper bus bars, grounding and bonding for the data cables and riser per the drawings.

3.03 FIELD QUALITY CONTROL

A. Quality Assurance: Field inspection, testing, adjusting.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform inspections and test reporting in accordance with NEC, NFPA 70.

END OF SECTION 16170

SECTION 16190 SUPPORTING DEVICES

PART 1GENERAL

1.01 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.02 REFERENCES

A. Quality Control: Requirements for references and standards.

B. NECA Standard of Installation (National Electrical Contractors Association).

C. NFPA 70 - National Electrical Code.

1.03 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals.

B. Product Data: Provide manufacturers catalog data for fastening systems.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. Materials and Finishes: Corrosion resistant.

B. Select materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit, including weight of wire in conduit.

C. Anchors and Fasteners:
1. Concrete Structural Elements: Use precast inserts, expansion anchors, powder actuated anchors and preset inserts.
2. Steel Structural Elements: Use beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
5. Solid Masonry Walls: Use expansion anchors and preset inserts.
6. Sheet Metal: Use sheet metal screws.
7. Wood Elements: Use wood screws.

2.02 FORMED STEEL CHANNEL

A. Manufacturers:
1. Unistrut.

B. Description: Galvanized steel.

2.03 POWDER-ACTUATED ANCHORS

A. Manufacturers:
1. Hilti.

2.04 SPRING STEEL CLIPS

A. Manufacturers:
1. B Line.
2. Minerallac.

PART 3EXECUTION

3.01 INSTALLATION

A. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
2. Obtain permission from Architect/Engineer before using powder-actuated anchors.
3. Obtain permission from Architect/Engineer before drilling or cutting structural members.

B. Fabricate supports from structural steel or formed steel members. Rigidly weld members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

C. Install surface-mounted cabinets and panelboards with minimum of four anchors.

D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.

E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

F. Follow the manufacturers and NEC stated instructions/requirements for the support of the MI cables.

END OF SECTION 16190

SECTION 16191 SEISMIC RESTRAINT

PART 1 - GENERAL

1.01 DESCRIPTION

A. It is the intent of this specification to provide the basis of seismic design for all components of the electrical system including conduit, lighting fixtures, panelboards, switchgear, data racks, video racks, sound/intercom/speaker systems and all accessory electrical equipment within and outside the building.

B. All systems must be installed and certified to remain in place in place and operating when subjected to a seismic force per code.

C. This specification is intended to assure compliance with all criteria established in the IBC 2012, including all CT 2013 amendments.

D. Owner Purchased and/or field fabricated equipment and systems must comply with this specification.

E. All equipment designated as life safety such as emergency generators must be capable of safely accepting external forces up to required IBC 2012/CT 2013 Amend. "G" load in any direction without permanent displacement of the supported equipment. Substitution of isolation supplied by equipment vendors in lieu of the specified isolation of this Section must be approved for individual equipment units and is acceptable only if above accelerations are certified in writing by equipment manufacturer and stamped by a licensed professional engineer.

1.02 SUBMITTAL DATA REQUIREMENTS

A. The submittal material shall include ten (10) copies of descriptive data for all products and materials including but not limited to the following:

1. Descriptive Data:
   a. Catalog cuts and data sheets on specific vibration isolators and restraints to be utilized showing compliance with the specifications and detailing all dimensional data of items supplied for this section.

   b. An itemized list showing all equipment of conduit to be isolated or restrained under this section.

   c. Seismic restraint calculations must be provided to certify compliance with the required IBC 2012/CT2013 Amend. "G" load. A certified professional engineer's stamp verifying the design and calculations for all seismic restraining system used must appear on all submittals.

2. Shop Drawings:
   a. Drawings are required to show equipment base tie-downs including dimensions, structural member sized and support point locations.

   b. Drawings showing methods of suspension and materials for restraints of conduit and suspended equipment.

c. Drawings showing housekeeping pad dimensions and steel layout for equipment using cast-in-place anchor plates for welding to equipment flanges.

d. Drawings showing number, location, diameter and embedment depth of anchor bolts on equipment not using welded plate assemblies.

1.03 MANUFACTURER RESPONSIBILITIES

A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:

1. Determine vibration isolator and seismic restraint sized and locations.

2. Provide conduit and equipment seismic restrains as required.

3. Where applicable guarantee specified isolation system deflection.

4. Provide installation instructions, drawings and field supervision to assure proper installation and performance.

PART 2 - PRODUCTS

2.01 DESCRIPTION

A. All vibration isolation and seismic devices shall be the product of a single manufacturer. Products of other manufacturers are acceptable provided their systems strictly comply with the design intent, performance, deflection and structural design of the base manufacturer.

2.02 SEISMIC RESTRAINT TYPES

A. General

1. All seismic restraints shall be capable of safely accepting one-half "G" external forces without failure, or one "G" for life safety equipment and shall maintain equipment, conduit, bus duct (as applies) and in a captive position. They shall be provided on all equipment as scheduled.

a. Spring Seismic Restraint, Type I: Shall comply with general characteristics of spring isolators. Shall incorporate snubbing restraint in all directions. Shall be capable of supporting equipment at a fixed elevation during equipment erection. Cast or aluminum housings are not acceptable. System to be field bolted to deck with 1G acceleration capability.

Mason type SSLFH, or as approved.

b. Seismic Restraint, Type II: Each corner or side shall incorporate minimum 5/8" thick resilient pad limit stops. Restraints shall be made of plate, structural members or square metal tubing concentric within a welded assembly incorporating resilient pads. Angle bumpers are not acceptable. System to be field bolted to

deck with 1G acceleration capability.

Mason Type Z-1011 and Z-1225, or as approved.

c. Seismic Restraint, Type III: Metal cable type with approved end fastening devices to equipment and structure.

d. Seismic Restraint, Type IV: Double deflection neoprene isolator encased in ductile iron casing with a minimum of 0.30 static deflection. System to be field bolted to deck with 1 G acceleration capacity.

Mason Type BR.

e. Seismic Restraint Type V: Non-isolated equipment to be field welded to steel cast-in-place plates.

B. Vibration Isolator Types:

1. Type A: Spring isolators shall incorporate the following:

a. Minimum diameter of 0.8 of the loaded operating height.

b. Corrosion resistance where exposed to corrosive environment.

c. Reserve deflection (from loaded to solid height) of 50% of rated deflection.

d. Minimum 1/4" thick neoprene acoustical base pad on underside, unless designated otherwise.

e. Designed and installed so that the ends of the springs remain parallel and all springs installed must have adjustment bolts.

Spring isolators to be Mason Type SLF, or as approved.

NOTE: This isolator must be accompanied by seismic isolator Type II.

2. Type B: Spring isolators shall be same as Type A, except:

a. Provide built-in vertical limit stops with minimum 1/4' clearance under normal operation.

b. Tapped holes in top plate for bolting to equipment when subject to wind load.

c. Capable of supporting equipment at a fixed elevation during equipment erection. Installed and operating heights shall be identical.

d. Adjustable and removable spring pack with separate neoprene pad isolation.

e. Housing to be designed to accept 1G of acceleration.

Mason Type SLR, or as approved.

3. Type C: Spring hanger rod isolators shall incorporate the following:

   a. Spring element seated on a steel washer within a neoprene cup incorporating a rod isolation bushing.

   b. Steel retainer box encasing the spring and neoprene cup.

   c. Requires seismic restraint Type III.

   Mason Type HS, or as approved.

4. Type E: Elastomer hanger rod isolators shall incorporate the following:

   a. Molded unit type neoprene element with projecting bushing lining rod clearance hole.

   b. Neoprene element to be minimum 1-3/4" thick.

   c. Steel retainer box encasing neoprene mounting.

   d. Clearance between mounting hanger rod and neoprene bushing shall be minimum of 1/8".

   e. Minimum static deflection of 0.35".

   f. Requires seismic restraint Type III.

   Mason Type HD, or as approved.

5. Type F: Combination spring/elastomer hanger rod isolators in incorporate the following:

   a. Spring and neoprene isolator elements in a steel box retainer. Neoprene of double deflection type. Single, deflection is unacceptable. Spring seated in a neoprene cup with extended rod bushing.

   b. Characteristics of spring and neoprene as described in Type A and Type E isolators.

   c. Requires seismic restraint Type III.

   Mason Type DNHS, or as approved.

6. Type C: Pad type elastomer mountings to incorporate the following:

   a. 0.750" minimum thickness.

   b. 50 psi

   c. Ribbed or waffled design.

   d. .10" deflection per pad thickness.

e. 1/16" galvanized steel plate between multiple layers or pad thickness.

f. Suitable bearing plate to distribute load.

Mason Type Super W, or as approved.

PART 3 - EXECUTION

3.01 GENERAL

A. All seismic bracing and tie downs shall be installed in accordance with manufacturer's written instructions.

B. All conduit 2 1/2" and over shall use Type III cable bracing.

C. All bus duct and cable tray runs shall use Type III cable bracing, if the suspension supports are greater than 12" long.

D. Any conduit or suspended equipment supported by rods 12" or less in length from the underside of the structural connection to the top of the conduit does not require any seismic bracing.

E. All connections to the structure shall be made to steel where possible. Any anchoring to the deck above must be approved by the structural engineer.

F. Concrete house-keeping pads with floor mounted equipment must be anchored to the structure. Doweling and adhesion to the concrete floor must be noted on the submittal.

G. Bolt points, embedment depth and diameter of inserts shall be submitted and verified as part of the contractors submission for each piece of equipment and certified by a licensed professional engineer.

H. Seismically restrain all conduit and bus duct with Type III restraining system in accordance with guideline as outlined below:

1. Conduit to be braced at 40 foot intervals and at turns of more than 4 feet.

2. Conduit to be restrained as per detail.

I. Where base anchoring is insufficient to resist seismic forces supplementary restraining such as seismic restraint system Type III shall be used above systems center of gravity to suitably resist "G" force levels.

J. For overhead supported equipment and systems, overstress of the building structure must not occur. Bracing can occur from:

1. Flanges of structural beams.

2. Upper or lower truss chords in bar joist construction at the panel points.

3. Cast in place inserts or drilled and shielded inserts in concrete structures.

K. Lighting fixtures in a seismic rated ceiling:

1. All ceiling mounted lighting shall be affixed to the ceiling by means of positive fasteners or earthquake clips.

2. Independent fixture support wires shall be supplied in addition to the attachment described in the preceding paragraph.

3. All independently supported lighting not in seismic rated ceiling shall be restrained with a minimum of four cables as in Type III already specified.

L. Lighting fixtures suspended from the structure:

1. All suspended lighting fixtures shall use four (4) cable restraints, type III. Seismic vendor to detail location and method of attachment.

3.02 EQUIPMENT & SYSTEMS INCLUDED

A. For reference purposes all equipment listed below must be included in the submittal package certifying appropriate seismic restraints have been utilized to meet the full intent of this specification:

1. Conduit Runs
2. Power Distribution Equipment
3. Panelboards
4. Data Racks
5. Lighting
6. Inverter
7. Other equipment, as required.

The need for seismic restraint is not limited to the above listing of equipment/systems. The above listing is equipment for which a submittal will be required.

END OF SECTION 16191

SECTION 16195 ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Conduit markers.

1.02 RELATED SECTIONS

A. Section - Painting.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Submit under provisions of Section Submittals.

B. Product Data: Provide catalog data for nameplates, labels, and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 EXTRA MATERIALS

NONE

PART 2 PRODUCTS

2.01 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.

B. Locations:
1. Each electrical distribution and control equipment enclosure.
2. Communication cabinets.
3. All systems devices, including, but not limited to, data, video, clocks and programs, sound, intercom, UPS, power, and controls.

C. Letter Size:

1. Use 1/8 inch letters for identifying individual equipment and loads.
2. Use 1/4 inch letters for identifying grouped equipment and loads.

D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations, and other similar individual elements.

2.02 WIRE MARKERS

A. Description: Tape, split sleeve, or tubing type wire markers.

B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.

C. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.

2.03 CONDUIT MARKERS

A. Description: Color coded tape labels.

B. Location: Furnish markers for each conduit longer than 6 feet from beginning to first junction/termination.

C. Spacing: 20 feet (+/-) on center.

D. Color: Provide color ID per voltage and system purpose.

2.04 UNDERGROUND WARNING TAPE

A. Manufacturers:
1. 3-M.

B. Description: 4 inch wide plastic tape, detectable type, colored yellow with suitable warning legend describing buried electrical lines.

2.05 DATA CABLES

A. See specific section for data cable markers.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws, rivets, or adhesive.

C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

D. Install colored bands 20 feet on center.

E. Identify underground conduits using underground warning tape.

END OF SECTION 16195

SECTION 16426 UTILITY SERVICE SWITCHBOARD SECTION MAIN SW AND CT

PART 1GENERAL

1.01 SECTION INCLUDES

A. Switchboard Sections.

B. Switchboard accessories.

1.02 RELATED SECTIONS

A. Cast-in-Place Concrete: Concrete for supporting foundations and pads.

1.03 REFERENCES

A. ANSI C12 - Code for Electricity Metering.

B. ANSI C39.1 - Requirements for Electrical Analog Indicating Instruments.

C. ANSI C57.13 - Requirements for Instrument Transformers.

D. NEMA AB 1 - Molded Case Circuit Breakers.

E. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

F. NEMA PB 2 - Dead Front Distribution Switchboards.

G. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.

H. NEMA 260 - Safety Labels for Padmounted Switchgear and Transformers Sited in Public Areas.

I. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment (International Electrical Testing Association).

J. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals: Procedures for submittals.

B. Product Data: Provide electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of all equipment and components.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; and switchboard instrument details.

1.05 SUBMITTALS FOR CLOSEOUT

A. Section Contract Closeout: Submittals for project closeout.

B. Record actual locations of switchboard in project record documents.

C. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Material and Equipment: Transport, handle, store, and protect products.

B. Deliver in 48 inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.

C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.10 MAINTENANCE MATERIALS

A. Section - Contract Closeout.

B. Furnish two of each key.

PART 2PRODUCTS

2.01 MANUFACTURERS

A. SIEMENS

B. GE

C. SQUARE D

2.02 SWITCHBOARD – SECTION/MAIN SW AND CT CABINET

A. Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified.

B. Ratings:
   1. Voltage: 120/208 volts.
   2. Configuration: Three phase, four wire, grounded.
   3. Main Bus: 1200 amperes, fused at 1200 amperes, Bussmann KRPC-1200SP or equal
   4. Integrated Equipment Rating: 100,000 rms amperes symmetrical.

C. Main Section Devices: Individually mounted.

D. Distribution Section Devices: does not apply.

E. Auxiliary Section Devices: does not apply.

F. Bus Material: Copper with silver plating, sized for 1000A per sq. in.

G. Bus Connections: Bolted, accessible from front for maintenance.

H. Bus bars shall be un insulated, with bus spacing based on air insulation.

I. Ground Bus: Extend length of switch.

J. Fusible Switch Assemblies, 800 Amperes and Larger: Bolted pressure contact switches. Fuse clips: Designed to accommodate Class L fuses.

K. Molded Case Circuit Breakers: does not apply.

L. Line and Load Terminations: Accessible from the <u>front only</u> of the switchboard, suitable for the conductor materials and sizes indicated.

M. Ground Fault Sensor: Does not apply.

N. Ground Fault Relay: Does not apply.

O. Metering Transformer Compartment: For Utility Company's use; compartment size, bus spacing and drilling, door, and locking and sealing requirements in accordance with Utility Company's (UI) requirements.

P. Pull Section: As applies, size as shown on Drawings.

Q. Future Provisions: does not apply.

R. Pull Box: As applies, removable top and sides, same construction as switchboard, size as shown.

S. Enclosure: Type 1 – Indoor **NOTE SPACE/SIZE LIMIT, SEE RISER.**
   1. Align sections - does not apply
   2. Switchboard Height: 90 inches, excluding floor sills, lifting members and pull boxes.
   3. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.03 MICROPROCESSOR BASED CUSTOMER METERING

NONE

2.04 SOURCE QUALITY CONTROL

A. Section - Quality Control: Manufacturer quality control.

B. Shop inspect and test switchboard according to NEMA PB 2.

PART 3EXECUTION

3.01 PREPARATION

A. Provide 6” or greater, see detail and notes, concrete housekeeping pad under the main switch and CT under provisions of this Section.

3.02 INSTALLATION

A. Install switchboard in location shown on Drawings, according to NEMA PB 2.1.

B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

C. Install fuses in switch.

3.03 FIELD QUALITY CONTROL

A. Section - Quality Assurance: Field inspection, testing, adjusting.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.1.

3.04 ADJUSTING

A. Section Contract Closeout: Adjusting installed work.

B. Adjust all operating mechanisms for free mechanical movement.

C. Tighten bolted bus connections in accordance with manufacturer's instructions.

3.05 CLEANING

A. Section Contract Closeout: Cleaning installed work.

B. Touch up scratched or marred surfaces to match original finish.

END OF SECTION 16426

SECTION 16441 ENCLOSED SWITCHES

PART 1GENERAL

1.01 SECTION INCLUDES

A. Fusible switches.

B. Non fusible switches.

1.02 RELATED SECTIONS

A. Section 16477 - Fuses.

1.03 REFERENCES

A. NECA - Standard of Installation (published by the National Electrical Contractors Association).

B. NEMA FU1 - Low Voltage Cartridge Fuses.

C. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (published by the International Electrical Testing Association).

E. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals: Procedures for submittals.

B. Product Data: Provide switch ratings and enclosure dimensions.

1.05 SUBMITTALS FOR CLOSEOUT

A. Section Contract Closeout: Submittals for project closeout.

B. Record actual locations of enclosed switches in project record documents.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2PRODUCTS

2.01 MANUFACTURERS

A. SIEMENS.

B. GE.

C. SQUARE D.

2.02 FUSIBLE SWITCH ASSEMBLIES

A. Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.

B. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.

2.03 NONFUSIBLE SWITCH ASSEMBLIES

A. Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position.

2.04 ENCLOSURES

A. Fabrication: NEMA KS 1.
1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.

PART 3EXECUTION

3.01 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install fuses in fusible disconnect switches.

C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.02 FIELD QUALITY CONTROL

A. Quality Control: Field inspection, testing, adjusting.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

D. Perform inspections and test reporting in accordance with NEC NFPA 70.

END OF SECTION 16441

SECTION 16470 PANELBOARDS

PART 1GENERAL

1.01 SECTION INCLUDES

A. Distribution panelboards.

B. Branch circuit panelboards.

1.02 RELATED SECTIONS

A. Section 16170 - Grounding and Bonding.

B. Section 16195 - Electrical Identification.

C. Section 16477 - Fuses.

1.03 REFERENCES

A. NECA Standard of Installation (published by the National Electrical Contractors Association).

B. NEMA AB1 - Molded Case Circuit Breakers.

C. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies.

D. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

E. NEMA PB 1 - Panelboards.

F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment (published by the International Electrical Testing Association).

H. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR REVIEW

A. Submit per Section - Submittals: Procedures for submittals.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.05 SUBMITTALS FOR CLOSEOUT

A. Contract Closeout: Submittals for project closeout.

B. Record actual locations of panelboards and record actual circuiting arrangements in project record documents.

C. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.08 MAINTENANCE MATERIALS

A. Section Contract Closeout.

B. Furnish two of each panelboard key.

PART 2PRODUCTS

2.01 DISTRIBUTION PANELBOARDS

A. Manufacturers:
1. GE.
2. SQUARE D.
3. SIEMENS.

B. Description: NEMA PB 1, circuit breaker type.

C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.

D. Minimum integrated short circuit rating: 22 KAIC amperes rms symmetrical for 240 volt panelboards; 22KAIC amperes rms symmetrical for 480 volt panelboards, and as indicated if higher.

E. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits. Circuit breakers to be bolt-on type.

F. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.

G. Enclosure: NEMA PB 1, Type 1 or 3R, as required.

H. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door-in-door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

I. Provide surge suppression for panels as noted on the riser. Use light/medium/heavy duty as noted. This is a 120/208.V, 3 phase, 4 wire system. Surge suppression system is to cascade with main switch protection.

2.02 BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:

1. GE.
2. SQUARE D.
3. SIEMENS.

B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.

D. Minimum Integrated Short Circuit Rating: 22,000 KAIC amperes rms symmetrical for 240 volt panelboards; 22,000 KAIC amperes rms symmetrical for 480 volt panelboards, and/or as indicated.

E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.

F. Enclosure: NEMA PB 1, Type 1 or Type 3R as required.

G. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.

H. Cabinet Front: Flush or surface cabinet front with concealed trim clamps, hinged door-in-door with flush lock, metal directory frame, all keyed alike. Finish In manufacturer's standard gray enamel.

I. Provide surge suppression for panels as noted on the riser. Use medium duty, sub panel protection. This is a 120/208V, 3 phase, 4 wire system. Surge suppression system is to cascade with main switchboard protection and distribution panel protection.

PART 3EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1 and the NECA "Standard of Installation."

B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

C. Height: 6 feet (1800 mm) to top of panelboard; install panelboards taller than 6 feet (1800 mm) with bottom no more than 4 inches (100 mm) above floor.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

F. Provide engraved plastic nameplates under the provisions of Section 16195.

G. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling and below floor. Minimum spare conduits: (2) empty 1 inch up and down. Identify each as SPARE.

H. Ground and bond panelboard enclosure according to Section 16170.

3.02 FIELD QUALITY CONTROL

A. Quality Control: Field inspection, testing, adjusting.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.4 for switches, Section 7.5 for circuit breakers.

D. Perform inspections and test reporting in accordance with NEC NFPA 70.

3.03 ADJUSTING

A. Section Contract Closeout: Adjusting installed work.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION 16470

SECTION 16477 FUSES

PART 1GENERAL

1.01 SECTION INCLUDES

A. Fuses.

B. Spare fuse cabinet.

1.02 RELATED SECTIONS

None

1.03 REFERENCES

A. NFPA 70 - National Electric Code.

B. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.04 SUBMITTALS

A. Submit under provisions of Section Submittals.

B. Product Data: Provide data sheets showing electrical characteristics including time-current curves.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section record Drawings.

B. Record actual fuse sizes.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

1.08 MAINTENANCE MATERIALS

A. Provide maintenance materials under provisions of this Section .
B. Provide two fuse pullers.

1.09 EXTRA MATERIALS

A. Furnish three of each size and type fuse installed.

PART 2PRODUCTS

2.01 MANUFACTURERS
A. Bussmann.

2.02 FUSE REQUIREMENTS

A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.

B. Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

C. Main Service Switches Larger than 600 amperes: Class L (time delay).

D. Main Service Switches: Class RK1 (time delay.

E. Power Load Feeder Switches Larger than 600 amperes: Class L (fast-acting).

F. Power Load Feeder Switches: Class RK1 (time delay).

G. Motor Load Feeder Switches: Class RK1 (time delay).

H. Lighting Load Feeder Switches Larger than 600 amperes: Class L, fast-acting.

I. Lighting Load Feeder Switches: Class RK1 (time delay).

J. Other Feeder Switches Larger than 600 amperes: Class L, fast acting.

K. Other Feeder Switches: Class RK1 (time delay).

L. Power Branch Circuits: Class RK1 (time delay).

M. Motor Branch Circuits: Class RK1 (time delay).

2.03 CLASS RK1 (TIME DELAY) FUSES

A. Manufacturers:

1. Bussmann, LPN-RK ands LPS-RK.

2.04 CLASS L (FAST-ACTING) FUSES

A. Manufacturers:
1. Bussmann, KTU.

2.05 CLASS L (TIME DELAY) FUSES

A. Manufacturers:
1. Bussmann, KRP-C.

PART 3EXECUTION

3.01 INSTALLATION

A. Install fuses in accordance with manufacturer's instructions.

B. Install fuse with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION 16477

SECTION 16480 CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Motor controls/motor starters.

Motor starters and motors are generally supplied by Division 15 unless specifically noted otherwise. The Div. 16 contractor is to coordinate with Div. 15 to be certain that the motor starter and motor are properly matched. Variable speed drives are supplied with the motor by Div. 15.

The electrical and mechanical contractors shall coordinate closely to be certain that motors and starters are properly matched.

1.2 RELATED SECTIONS

A. Section 16195 - Electrical Identification: Engraved nameplates.

1.3 REFERENCES

A. Section Quality Control: Requirements for references and standards.

B. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.

C. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

D. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers.

E. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

F. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

G. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

A. Submit per Section Submittals: Procedures for submittals.

B. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time/current curves of all equipment and components.

1.5 SUBMITTALS FOR CLOSEOUT

A. Section Operation and Maintenance Data: Procedures for submittals.

B. Maintenance Data: Replacement parts list for controllers.

1.6 QUALITY ASSURANCE

A. Provide products from a company specializing in manufacturing products specified in this section with a minimum of three years experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Material and Equipment: Transport, handle, store, and protect products.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy
canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle in accordance with NEMA ICS 2.3. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Material and Equipment: Environmental conditions affecting products on site.

B. Conform to NEMA ICS 2 service conditions during and after installation of motor control centers.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Siemens

B. Square D

C. GE

2.2 MANUAL CONTROLLERS

A. Manual Motor Controller: NEMA ICS 2, AC general purpose, Class A, manually operated, full voltage controller with overload element, red pilot light, NO/NC auxiliary contacts, and toggle operator.

B. Fractional Horsepower Manual Controller: NEMA ICS 2, AC general purpose, Class A, manually operated, full voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light and toggle operator.

C. Motor Starting Switch: NEMA ICS 2, AC general purpose Class A manually operated, full voltage controller for fractional horsepower induction motors, without thermal overload unit, with red pilot and toggle operator.

D. Enclosures: NEMA ICS 6, type 1, 1B, 3R or 4 as required to meet conditions of installation.

2.3 AUTOMATIC CONTROLLERS/COMBINATION MOTOR STARTERS/DISCONNECTS

A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.

B. Reversing Controllers: Include electrical interlock and integral time delay transition between FORWARD and REVERSE rotation.

C. Two-Speed Controllers: Include integral time delay transition between FAST and SLOW speeds.

D. Coil operating voltage: 120 volts, 60 Hertz.

E. Overload Relay: NEMA ICS; bimetal.

F. Enclosure: NEMA ICS 6, Type 1 and 3R.

2.3 PRODUCT OPTIONS AND FEATURES

A. Auxiliary Contacts: NEMA ICS 2, 2 each normally open/closed field convertible contacts in addition to seal-in contact.

B. Cover Mounted Pilot Devices: NEMA ICS 2, standard duty type.

C. Pilot Device Contacts: NEMA ICS 2, Form Z, rated A150

D. Pushbuttons: Unguarded type.

E. Indicating Lights: Transformer, incandescent type.

F. Selector Switches: Rotary type.

G. Relays: NEMA ICS 2, 20A min rating.

H. Control Power Transformers: 120 volt secondary, 100 VA minimum, in each motor starter. Provide fused primary and secondary, and bond unfused leg of secondary to enclosure.

I. Combination Controllers: Combine motor controllers with fusible switch disconnect in common enclosure. Obtain IEC Class 2 coordinated component protection.

PART 3 EXECUTION

3.1 EXAMINATION

A. Coordination and Meetings: Verification of existing conditions prior to beginning work.

B. Verify that surfaces are suitable for motor control center installation.

C. Verify that field measurements are as indicated on shop drawings.

3.2 INSTALLATION

D. Section - Quality Control: Manufacturer's instructions.

E. Install motor controls in accordance with NECA "Standard of Installation."

F. Tighten accessible bus connections and mechanical fasteners.

G. Provide fuses in fusible switches.

H. Select and install heater elements in motor starters to match installed motor characteristics.

I. Provide engraved plastic nameplates; refer to Section 16195 for product requirements and location.

J. Motor Data: Neatly type label inside each motor starter door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

3.2 FIELD QUALITY CONTROL

A. Section Quality Control: Field inspection, testing, adjusting.

B. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.16.2

END OF SECTION 16480

SECTION 16721 DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Magnetic door holders.
7. Remote annunciator.
8. Addressable interface device.
9. Digital alarm communicator transmitter.

1.3 DEFINITIONS

A. LED: Light-emitting diode.

B. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTION

A. Noncoded, UL-certified addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

1.5 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to IBC, current issue in effect.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified.

1.6 SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect/Engineer.
2. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified fire-alarm technician, Level III minimum.

c. Licensed or certified by authorities having jurisdiction.

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

C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Include voltage drop calculations for notification appliance circuits.
3. Include battery-size calculations.
4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
6. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
7. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

D. Delegated-Design Submittal: For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Drawings showing the location of each smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the detector.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.

E. Qualification Data: For qualified Installer.

F. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

G. Field quality-control reports.

H. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Copy of NFPA 25.

I. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.

C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL, UL, and FMG. .

1.8 PROJECT CONDITIONS

A. Interruption of Existing Fire-Alarm Service: Do not interrupt existing fire-alarm service to facilities until arranging to provide temporary fire alarm service to protect the building during the renovation period. The contractor is to determine the extent of this effort in conjunction with the Owner and Construction Manager. The existing fire alarm system may be utilized for this effort with modifications as may be required to allow for sensing within the construction area environment.

1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of fire-alarm service.

2. Do not proceed with interruption of fire-alarm service without Construction Manager's and Owner's written permission.

1.9 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.10 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning with Substantial Completion, provide software support for two years.

C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1.11 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than 1 unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than 1 unit.
3. Smoke Detectors, Fire Detectors: Quantity equal to percent of amount of each type installed, but no fewer than 1 unit of each type.
4. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but no fewer than 1 unit of each type.
5. Keys and Tools: One extra set for access to locked and tamperproofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following.
1. Fire Lite Alarms; a Honeywell company.
2. GE Infrastructure; a unit of General Electric Company.

3. NOTIFIER; a Honeywell company.
4. Siemens Building Technologies, Inc.; Fire Safety Division.
5. SimplexGrinnell LP; a Tyco International company.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Verified automatic alarm operation of smoke detectors.
6. Automatic sprinkler system water flow (as may apply).
7. Detectors in elevator shaft and pit.
8. Other

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm at fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
8. Close smoke dampers in air ducts of designated air-conditioning duct systems.
9. Recall elevators to primary or alternate recall floors.
10. Record events in the system memory.
11. Other

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch (as may apply).
2. Low-air-pressure switch of a dry-pipe sprinkler system (as may apply).
3. Elevator trip supervision.
4. Other

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at fire-alarm control unit.
4. Ground or a single break in fire-alarm control unit internal circuits.
5. Abnormal ac voltage at fire-alarm control unit.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire-alarm control unit or annunciator.
9. Fire-pump power failure, including a dead-phase or phase-reversal condition (as may apply).
10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system (as may apply).

11. Other

E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer.

2.3 FIRE-ALARM CONTROL UNIT

A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.

   a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
   b. Include a real-time clock for time annotation of events on the event recorder and printer.

2. Addressable initiation devices that communicate device identity and status.

   a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit.
   b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.

3. Addressable control circuits for operation of mechanical equipment.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

C. Circuits:

1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.

   a. Initiating Device Circuits: Style B.
   b. Notification Appliance Circuits: Style Y.
   c. Signaling Line Circuits: Style 4.
   d. Install no more than 50 addressable devices on each signaling line circuit.

2. Serial Interfaces: Two RS-232 ports for a future printer.

D. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.

2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Record events by the system printer.
4. Sound general alarm if the alarm is verified.
5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

E. Notification Appliance Circuit: Operation shall sound in a general voice message. Message shall be approved by the local Fire Marshal.

F. Elevator Recall:

1. Smoke detectors at the following locations shall initiate automatic elevator recall

   a. Elevator lobby detectors except the lobby detector on the designated floor.
   b. Smoke detector in elevator machine room.
   c. Smoke detectors in elevator hoistway.

2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
3. Water-flow alarm (as may apply) connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

   a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.

H. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

J. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided in the front and rear entry points to the building next to the anuunciator units.

1. Indicated number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711 and be listed by an NRTL.

   a. Allow the application of and evacuation signal to indicated number of zones and, at same time, allow voice paging to the other zones selectively or in any combination.
   b. Programmable tone and message sequence selection.
   c. Standard digitally recorded messages for "Evacuation" and "All Clear."

d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification appliance circuits of fire-alarm control unit.

2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

L. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed lead calcium/other as recommended by manufacturer.

M. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Double-action mechanism requiring two actions to initiate an alarm, breaking-glass or plastic-rod and or pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be listed two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

    a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
    b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
    c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Ionization Smoke Detector

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
4. Each sensor shall have multiple levels of detection sensitivity.

5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.6 NONSYSTEM SMOKE DETECTORS- not used

2.7 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Continuous Linear Heat-Detector System- not used.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections.

B. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

C. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.

D. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.

E. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

F. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:
   a. 15/30/75/110 cd, selectable in the field as required for the area. Designation to be made on shop drawing submittal.

2. Mounting: Wall mounted unless otherwise indicated.

3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

G. Voice/Tone Notification Appliances

1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1 to 2 W.
4. Mounting: Semi-recessed and /or surface mounted, as required.
5. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.9 FIREFIGHTERS' TWO-WAY TELEPHONE COMMUNICATION SERVICE- not used

2.10 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.
4. Rating: 120-V ac.

B. Material and Finish: Match door hardware.

2.11 REMOTE ANNUNCIATOR WITH MICROPHONE STATION

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Surface cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

C. The remote annunciator station shall include a microphone to allow for voice instructions to be manually transmitted to the building speaker/strobe units.

2.12 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall, to circuit-breaker shunt trip for power shutdown and other functions as required.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one or two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.
8. Signal to be transmitted per local Fire Marshal.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.14 RADIO ALARM TRANSMITTER- not used

2.15 SYSTEM PRINTER- not used.

2.16 DEVICE GUARDS- not used

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. All visible fire alarm circuits in finished areas are to be concealed and protected in raceways. Fire alarm circuits above a concealing ceiling may be done in methods listed in the NEC. Wiring in mechanical or equipment spaces shall be done in raceways. Raceways are surface metal raceways and other systems as described in this specification.

C. Equipment Mounting: Install fire-alarm control unit with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

1. Install seismic bracing. Comply with requirements in Division 16 Seismic Section.
2. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

D. Smoke- or Heat-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
5. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

F. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.

G. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

H. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.

J. Device Location-Indicating Lights: Locate in public space near the device they monitor.

K. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

L. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

3.2 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
1. Smoke dampers in air ducts of designated air-conditioning duct systems.
2. Alarm-initiating connection to elevator recall system and components.
3. Supervisory connections at valve supervisory switches.
4. Supervisory connections at elevator shunt trip breaker.
5. Others.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by AHJ.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents,

Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.

b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 16721

SECTION 16725-COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pathways.
2. UTP cabling.
3. Cable connecting hardware, patch panels.
4. Cabling system identification products.

B. Related Sections:

All electrical specification sections.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

D. EMI: Electromagnetic interference.

E. IDC: Insulation displacement connector.

F. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

G. LAN: Local area network.

H. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors- may not apply to this project

I. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

J. RCDD: Registered Communications Distribution Designer.

K. Solid-Bottom or Non-ventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom without ventilation openings.

L. Trough or Ventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom having openings for the passage of air.

M. UTP: Unshielded twisted pair.

1.4 HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the patch panel(s) located in the 2nd floor Data Closet. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.

1. Horizontal cabling shall contain no transition point or consolidation point between the patch panel (s) and the telecommunications outlet/connector.
2. Bridged taps and splices shall not be installed in the horizontal cabling.
3. Splitters shall not be installed as part of the optical fiber cabling.

B. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment, patch cords and cross connects in general.

1.5 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-curent issue, when tested according to test procedures of this standard, category 6.

B. Specific testing, certification of and reporting shall be provided in accordance with Specification Section 16727.

1.6 SUBMITTALS

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

B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. Cabling administration drawings and printouts.
3. Wiring diagrams to show typical wiring, including the following:

   a. Patch panels.

4. Patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

C. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration.

D. Qualification Data: For installer qualified layout technician, installation supervisor, and field inspector.

E. Source quality-control reports.

F. Field quality-control reports.

G. Maintenance Data: For connectors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

E. Grounding: Comply with ANSI-J-STD-607-A.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test each pair of UTP cable for open and short circuits.
2. Delivery and receipt of products shall be at the site.
3. Cable shall be stored according to manufacturers' recommendations at a minimum. In addition, cable must be stored in a location protected from vandalism and weather. Air temperature at cable storage shall not be less than 50 deg F or exceed 130 deg F. Storage location shall be well ventilated to prevent condensation.

1.9 COORDINATION

A. Coordinate all facets of the products, layout and installation of telecommunications pathways and cabling with Owner's IT department. Do not start any procurement or installation work without consent of Owner's IT department.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Device Plates: Five (5) of each type.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. General Requirements: Comply with TIA/EIA-569-A.

B. Cable Support: NRTL labeled 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.

C. Cable Trays: as described on the drawings, used in the second floor data room..

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, size per the drawings.

2.3 UTP CABLE- **Manufacturer and cable type must be approved by Owners's IT department**

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Mohawk; AdvanceNet, cable 6e plus plenum rated.
2. Other vendors only as approved by Owners's IT department.

B. Description: 100 –ohm, 4-pair #23 AWG, UTP, category 6e plus, plenum rated, covered with a black thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 6.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

a. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
b. Communications, Riser Rated: Type CMR, complying with UL 1666.
c. Communications, Limited Purpose: Type CMX.
d. Multipurpose: Type MP or MPG.
e. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
f. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.

2.4 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

All products must be approved by Owners' IT department.

1. Hubbell Premise Wiring.
2. Leviton Voice & Data Division.
3. Panduit Corp.
4. Siemon Co. (The).

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Patch Panel: RJ45, or Owner IT approved equal connector compatible panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: **One** for each four-pair cable indicated, plus 25% spares and blank positions per floor level, adequate to suit specified expansion criteria.

D. Jacks and Jack Assemblies: RJ45 or **Owner IT approved** equal, modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals. Jacks shall mount into standard 3 position wall plates, plate color by Architect.

2.5 OPTICAL FIBER CABLE- not used

2.6 COAXIAL CABLE- not used.

2.7 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.

B. Workstation Outlets: Three (3) port-connector assemblies mounted in single faceplate.

1. Plastic Faceplate: High-impact plastic. Color to be approved by ArchitectFor use with snap-in jacks. Flush mounting jacks, three positions..
2. Legend: Machine printed, in the field, using adhesive-tape label.
3. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.8 GROUNDING

A. Comply with requirements in Division 16 Sections for grounding conductors and connectors.

B. Comply with ANSI-J-STD-607-A (current issue).

2.9 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Division 16 Section Identification for Electrical Systems.

2.10 SOURCE QUALITY CONTROL

A. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1(current issue).

B. Factory test UTP cables according to TIA/EIA-568-B.2 (current issue).

C. Cable will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES- does not apply, by others.

3.2 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
   1. Comply with requirements for raceways and boxes specified in Division 16 Sections.

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors.

C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

   1. Comply with TIA/EIA-568-B.1.
   2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
   3. Install 110-style IDC termination hardware unless otherwise indicated.
   4. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
   5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
   7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.

8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
10. In the communications equipment room, install a 10-foot long service loop on each end of cable.
11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches .
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches .
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches .

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches .
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches .
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches .

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches .
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches .

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches .
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches .

3.4 FIRESTOPPING

A. Comply with requirements in Section "Penetration Firestopping."

B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 3 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 16 Section Identification for Electrical Systems.

1. Administration Class: 2 or 3 ; as directed by Owners' IT Department.
2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.

C. Comply with requirements in Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets,

backbone pathways and cables, entrance pathways and cables**,** terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Testing and Certification per Specification Section 16727.

B. Tests and Inspections:

1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements

in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. UTP Performance Tests- per Specification Section 16727.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 16725

SECTION 16727 TESTING, IDENTIFICATION AND ADMINISTRATION OF BALANCED TWIST PAIR INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification, administration and certification of the work called for in the Contract Documents.

B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.

C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.

1.2 SCOPE

A. This Section includes the minimum requirements for the test certification, identification and administration of horizontal balanced twisted pair cabling.

B. This Section includes minimum requirements for:

1. Copper cabling test instruments
2. Copper cabling testing
3. Identification
   a) Labels and labeling
4. Administration
   a) Test results documentation
   b) As-built drawings

C. Testing shall be carried out in accordance with this document.

D. **Testing shall be performed on each cabling link. (100% testing)**

E. All tests shall be documented.

1.3 QUALITY ASSURANCE

A. All testing procedures and field-test instruments shall comply with applicable requirements of:

1. ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
2. ANSI/TIA-568-0.D, Generic Telecommunications Cabling for Customer Premises.
3. ANSI/TIA-568-1.D, Commercial Building Telecommunications Cabling Standard
4. ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
5. ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.

B. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

1. Manufacturer of the connectors or cable.
2. Manufacturer of the test equipment used for the field certification.

3. Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida.

C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.

1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five business days before testing commences.

2. The Owner or the Owner's representative will select a random sample of five percent of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than two percent of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat one hundred percent testing at no cost to the Owner.

1.4 SUBMITTALS

A. Manufacturers catalog sheets and specifications for the test equipment.

B. A list of all balanced twisted-pair copper links to be tested.

C. Sample test reports.

1.5 ACCEPTANCE OF TEST RESULTS

A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in tested for:

1. Wire Map
2. Length
3. Propagation Delay
4. Delay Skew
5. DC Loop Resistance
6. DC Resistance Unbalance within a pair
7. DC Resistance Unbalance between pairs
8. Insertion Loss
9. NEXT (Near-End Crosstalk)
10. PS NEXT (Power Sum Near-End Crosstalk)
11. ACR-N (Attenuation to Crosstalk Ratio Near-End)
12. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
13. ACR-F (Attenuation to Crosstalk Ratio Far-End)
14. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
15. Return Loss
16. TCL (Transverse Conversion Loss)
17. ELTCTL (Equal Level Transverse Conversion Transfer Loss)
18. PS ANEXT (Power Sum Alien Near-End Crosstalk) – sampled per section 3.2
19. Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk) – sampled per section 3.2
20. PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End) – sampled per section 3.2

21. Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End) – sampled per section 3.2

B. All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation in accordance with Part 3.

C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

PART 2 - PRODUCTS

2.1 BALANCED TWISTED-PAIR CABLE TESTERS

A. The field-test instrument shall be within a 12 month calibration period.

B. Certification tester

1. Accuracy
   - a) Level IIIe accuracy in accordance with ANSI/TIA-1152
   - b) Independent verification of accuracy shall be provided
   - c) Acceptable manufacturer
     - 1) Fluke Networks
2. Permanent Link Adapters
   - a) RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568-C.2 Annex C
   - b) Twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures
3. Results Storage
   - a) Must be capable of storing > 10,000 results for all measurements found in 2.1.B.4 below
4. Measurement capabilities
   - a) Wire Map
   - b) Length
   - c) Propagation Delay
   - d) Delay Skew
   - e) DC Loop Resistance
   - f) DC Resistance Unbalance within a pair
   - g) DC Resistance Unbalance between pairs
   - h) Insertion Loss
   - i) NEXT (Near-End Crosstalk)
   - j) PS NEXT (Power Sum Near-End Crosstalk)
   - k) ACR-N (Attenuation to Crosstalk Ratio Near-End)
   - l) PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)

m) ACR-F (Attenuation to Crosstalk Ratio Far-End)

n) PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)

o) Return Loss

p) TCL (Transverse Conversion Loss)

q) ELTCTL (Equal Level Transverse Conversion Transfer Loss)

r) Time Domain Reflectometer

s) Time Domain Xtalk Analyzer

t) PS ANEXT (Power Sum Alien Near-End Crosstalk)

u) Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk)

v) PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End)

w) Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End)

C. PC Software

1. LinkWare PC or equal.

Identification

D. Labels

1. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
2. Shall be preprinted using a mechanical means of printing (e.g., laser printer).
3. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.
4. Where insert type labels are used provide clear plastic cover over label.
5. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18” above all direct buried services, underground conduits and duct-banks.
6. Acceptable Manufacturers:

a) Brothers

b) Silver Fox

c) Brady Corporation

2.2 ADMINISTRATION

A. Administration of the documentation shall include test results of each Permanent Link.

B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.

C. The test result records saved within the field-test instrument shall be transferred to LinkWare PC via LinkWare Live.

D. Alien Crosstalk measurements shall be stored to a PC upon completion of the test.

PART 3 – EXECUTION

3.1 GENERAL

A. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 BALANCED TWISTED PAIR CABLE TESTING

A. Field-test instruments shall have the latest firmware installed.

B. Permanent Link test results, including the individual frequency measurements from the tester, shall be recorded in the test instrument upon completion of each test for subsequent uploading to LinkWare PC via LinkWare Live in which the administrative documentation (reports) may be generated.

C. Permanent Link testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.

D. Alien Crosstalk testing shall be performed using a sampling plan. An acceptance quality level (AQL) of 0,4 %, normal inspection, general inspection level I as defined in ISO 2859-1 for populations of up to 500,000 links shall be used. The following table represents this sampling level.

Total number of links (N)	**Sample size (No. of links to test)**
3 – 33	3 or 0.1 x N (whichever is greatest)
34 – 3,200	33
3,201 – 35,000	126
35,001 – 150,000	201
150,001 – 500,000	315

E. Disturbed (Victim) links chosen for Alien Crosstalk testing shall be an equal combination of short, medium and long links.

F. Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

G. The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6A Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.

H. Wire Map Measurement

1. The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors.

2. For each of the eight conductors in the cabling, the wire map indicates:

   a) Continuity to the remote end

   b) Shorts between any two or more conductors

   c) Reversed pairs

   d) Split pairs

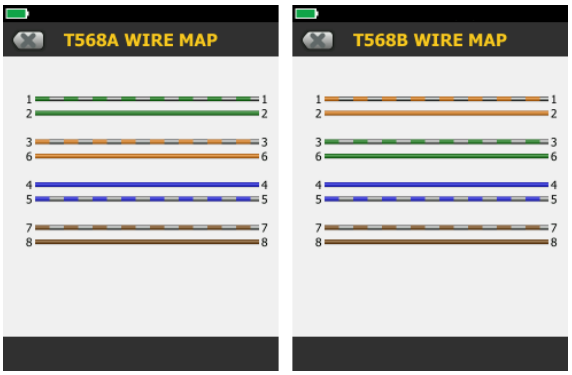
   e) Transposed pairs

   f) Distance to open on shield

   g) Any other miss-wiring

3. The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568-C.2. Two color schemes are permitted. The user shall define which scheme is to be

used. The field tester shall document which color scheme was used. Examples are given below:



I. Length Measurement

1. The length of each balanced twisted pair shall be recorded.
2. Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay shall be reported and used for making the pass or fail determination.
3. The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568-C.2 plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.

J. Propagation Delay measurement

1. Is the time it takes for a signal to reach the end of the link.
2. The measurement shall be made at 10 MHz per ANSI/TIA-1152.
3. The propagation delay of each balanced twisted pair shall be recorded.
4. Is not to exceed 498 ns per ANSI/TIA-568-C.2 Section 6.3.18.

K. Delay Skew measurement

1. Is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
2. The delay skew of each balanced twisted pair shall be recorded.
3. Is not to exceed 44 ns per ANSI/TIA-568-C.2 Section 6.3.19.

L. DC Loop Resistance

1. Often reported as Resistance, is the DC loop resistance of both conductors in the pair.
2. The DC Resistance shall be reported for all four pairs.
3. Is not to exceed 21 Ω for all four pairs per ANSI/TIA-568-C.2 Section 6.3.1.

M. DC Resistance Unbalance within a pair

1. Is the difference in DC resistance of the two wires within the same pair.
2. The DC Resistance Unbalance within a pair shall be reported for all four pairs.
3. Is not to exceed 200 mΩ or 3%, whichever is the greatest per ANSI/TIA-568-C.2 Section 6.2.2.

N. DC Resistance Unbalance between pairs

1. Is the difference in DC parallel resistance of the conductors of a pair compared to the DC parallel resistance of another pair, given in the formula below:

$$Resistance_Unbalance_{Between_pairs} = \left(\frac{|R_{P1} - R_{P2}|}{R_{P1} + R_{P2}} \right) 100\%$$

Where:

R_{P1} is the DC parallel resistance of the conductors of a pair.

R_{P2} is the DC parallel resistance of the conductors of another pair.

2. The DC Resistance Unbalance shall be reported for the following pairs
   a) 1,2-3,6
   b) 1,2-4,5
   c) 1,2-7,8
   d) 3,6-4,5
   e) 3,6-7,8
   f) 4,5-7,8
3. Is not to exceed 200 mΩ or 7.5%, whichever is the greatest.

O. Insertion Loss

1. Is the loss of signal strength over the cabling (in dB).
2. The frequency resolution shall be:
   a) 1 – 31.25 MHz: 150 kHz
   b) 31.25 – 100 MHz: 250 kHz
   c) 100 – 250 MHz: 500 kHz
   d) 250 – 500 MHz: 1000 kHz
3. Both worst case and worst margins shall be reported in one direction for all four pairs.
4. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.7.

P. NEXT (Near-End Crosstalk)

1. Is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
2. The frequency resolution shall be:
   a) 1 – 31.25 MHz: 150 kHz
   b) 31.25 – 100 MHz: 250 kHz
   c) 100 – 250 MHz: 500 kHz
   d) 250 – 500 MHz: 1000 kHz
3. Both worst case and worst margins shall be reported in both directions for the following pair combinations
   a) 1,2-3,6
   b) 1,2-4,5

c) 1,2-7,8

d) 3,6-4,5

e) 3,6-7,8

f) 4,5-7,8

4. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.8.
5. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
6. The Time Domain Xtalk data shall be stored for any marginal or failing NEXT results.

Q. PS NEXT (Power Sum Near-End Crosstalk)

1. Is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Both worst case and worst margins shall be reported in both directions for all four pairs.
4. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.9.
5. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
6. The Time Domain Xtalk data shall be stored for any marginal or failing PS NEXT results.

R. ACR-N (Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Both worst case and worst margins shall be reported in both directions for the following pairs

a) 1,2-3,6

b) 1,2-4,5

c) 1,2-7,8

d) 3,6-4,5

e) 3,6-7,8

f) 4,5-7,8

4. Although not specified in ANSI/TIA-568-C.2, it shall be recorded for all twelve possible combinations.

S. PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a) 1 – 31.25 MHz: 150 kHz
   b) 31.25 – 100 MHz: 250 kHz
   c) 100 – 250 MHz: 500 kHz
   d) 250 – 500 MHz: 1000 kHz
3. Both worst case and worst margins shall be reported in both directions for all four pairs.5
4. Although not specified in ANSI/TIA-568-C.2, it shall be recorded for all eight possible combinations.

T. ACR-F (Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a) 1 – 31.25 MHz: 150 kHz
   b) 31.25 – 100 MHz: 250 kHz
   c) 100 – 250 MHz: 500 kHz
   d) 250 – 500 MHz: 1000 kHz
3. Both worst case and worst margins shall be reported in both directions for the following pairs
   a) 1,2-3,6
   b) 1,2-4,5
   c) 1,2-7,8
   d) 3,6-1,2
   e) 3,6-4,5
   f) 3,6-7,8
   g) 4,5-1,2
   h) 4,5-3,6
   i) 4,5-7,8
   j) 7,8-1,2
   k) 7,8-3,6
   l) 7,8-4,5
4. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.11.
5. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

U. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)

1. Is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Both worst case and worst margins shall be reported in both directions for all four pairs.
4. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.13.
5. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

V. Return Loss

1. Is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Both worst case and worst margins shall be reported in both directions for all four pairs.
4. Shall be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.6.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Reflectometer data shall be stored for any marginal or failing Return Loss results.

W. TCL (Transverse Conversion Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Both worst case and worst margins shall be reported in both directions for all four pairs.
4. Is not to exceed the Category 6A limits found ANSI/TIA-568-C.2 Section 6.2.14.

X. ELTCTL (Equal Level Transverse Conversion Transfer Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Both worst case and worst margins shall be reported in both directions for all four pairs.
4. Is not to exceed the Category 6A limits found in ANSI/TIA-568-C.2 section 6.2.16.

Y. PS ANEXT (Power Sum Alien Near-End Crosstalk)

1. Takes into account the combined alien crosstalk (statistical) on a receive pair from all external near-end disturbers operating simultaneously.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. The disturbed (victim) link shall have disturber links to the left and right of it and if present, links above and below it.
4. Disturber cables shall include all links within the same bundle as the disturbed (victim) link and adjacent links
5. Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it shall be measured from the patch panel end only.
6. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.21.

Z. Average PS ANEXT (Power Sum Alien Near-End Crosstalk)

1. Is calculated by averaging the individual PSANEXT loss values, in dB, for all four pairs in the disturbed (victim) link.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.22.

AA. PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End)

1. AFEXT loss is the coupling of crosstalk at the far-end from external link pairs into a disturbed (victim) pair of the 4-pair link under test. PS AACR-F is the calculated power sum from all external pairs into the disturbed (victim) pair.
2. The frequency resolution shall be:

a) 1 – 31.25 MHz: 150 kHz

b) 31.25 – 100 MHz: 250 kHz

c) 100 – 250 MHz: 500 kHz

d) 250 – 500 MHz: 1000 kHz

3. The disturbed (victim) link shall have disturber links to the left and right of it and if present, links above and below it.
4. Disturber cables shall include all links within the same bundle as the disturbed (victim) link and adjacent links
5. Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it shall be measured from the patch panel end only.
6. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.25.

BB. Average PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End)

1. Is calculated by averaging the individual PS AACR-F values, in dB, for all four pairs in the disturbed (victim) link.
2. The frequency resolution shall be:
   a) 1 – 31.25 MHz: 150 kHz
   b) 31.25 – 100 MHz: 250 kHz
   c) 100 – 250 MHz: 500 kHz
   d) 250 – 500 MHz: 1000 kHz
3. The disturbed (victim) link shall have disturber links to the left and right of it and if present, links above and below it.
4. Disturber cables shall include all links within the same bundle as the disturbed (victim) link and adjacent links
5. Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it shall be measured from the patch panel end only.
6. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.26.

3.3 ADMINISTRATION

A. Test results documentation

1. The Permanent Link test results (excluding alien xtalk testing) shall be uploaded to LinkWare Live at the end of each working day for inspection by the Owner or the Owner's representative.
2. Test results uploaded to LinkWare Live shall be transferred into LinkWare PC to allow for the maintenance, inspection and archiving of the test records.
3. The database for the complete project, including fiber links, if applicable, shall be stored in LinkWare PC format (*.flw) and delivered on CD or DVD prior to Owner acceptance of the building. This CD or DVD shall include a copy of LinkWare PC to allow the inspection and printing of the test reports.
4. Circuit IDs reported by the test instrument should match the specified label ID .
5. For Permanent Link testing, the detailed test results documentation data is to be provided in LinkWare PC for each tested balance twisted-pair and shall contain the following information
   a) The overall Pass/Fail evaluation of the link-under-test
   b) The date and time the test results were saved in the memory of the tester

c) The identification of the customer site as specified by the end-user

d) The name of the test limit selected to execute the stored test results

e) The name of the personnel performing the test

f) The version of the test firmware and the version of the test limit database held within the test instrument

g) The manufacturer, model and serial number of the field-test instrument

h) The adapters used

i) The factory calibration date

j) Wire Map

k) Propagation Delay values, for all four pairs

l) Delay Skew values, for all four pairs

m) DC Resistance values, for all four pairs

n) DC Resistance Unbalance within a pair, values for all four pairs

o) DC Resistance Unbalance between pairs, values for all four pairs

p) Insertion Loss, worst case values for all four pairs

q) NEXT, worst case margin and worst case values, both directions

r) PS NEXT, worst case margin and worst case values, both directions

s) ACR-N, worst case margin and worst case values, both directions

t) PS ACR-N, worst case margin and worst case values, both directions

u) ACR-F, worst case margin and worst case values, both directions

v) PS ACR-F, worst case margin and worst case values, both directions

w) Return Loss, worst case margin and worst case values, both directions

x) TCL, worst case margin and worst case values, both directions

y) ELTCTL, worst case margin and worst case values, both directions.

z) Time Domain Crosstalk data if the link is marginal or fails

aa) Time Domain Reflectometer data if the link is marginal or fails

6. For Alien Crosstalk testing, the detailed test results documentation data is to be provided in AxTalk Analyzer for each tested balance twisted-pair and shall contain the following information

a) The overall Pass/Fail evaluation of the link-under-test

b) The date and time the measurements were made

c) The identification of the customer site as specified by the end-user

d) The name of the test limit selected to execute the stored test results

e) The name of the personnel performing the test

f) The version of the test software

g) PS ANEXT, worst case margin for all four pairs

h) Average PS ANEXT, worst case margin

i) PS AACR-F, worst case margin for all four pairs

j) Average PS AACR-F, worst case margin

B. Record copy and as-built drawings

1. Provide record copy drawings periodically through out the project as requested by the Construction Manager or Owner, and at end of the project on a CD or DVD. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. The as-built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. The as-builts shall include all field changes made up to construction completion:

   a) Field directed changes to pull schedule.

   b) Horizontal cable routing changes.

   c) Associated detail drawings.

END OF SECTION 16727